American Machinist

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Ocean Transport—Launching the Glenn Martin Model 156 heralds regular Atlantic air service (page 1212)

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The Biggest Review We have ever published

. . . coming January 26

OVER 750 new items of machines, tools, parts, materials and equipment, which were announced during the year, will be reviewed in the 25th Buyers Reference Number of AMERICAN MACHINIST . . . more than ever before.

Probably the most complete catalog of new equipment published for the metal working field, the new issue will be arranged in more convenient make-up. The products will be broken up into 13 groups of allied items . . . each to have a distinctive section start . . . indexed for quick reference.

Make it a point to be on the look out for your copy of the Reference issue. Keep it handy for use during all of 1938 . . . it will be an extremely valuable directory to answer equipment questions as they come up.

The date of issue is January 26. Watch for it!

AMERICAN MACHINIST

EDITORIAL

Wages and Hours by Fiat

LABOR DOESN'T want it, employers dread it, farmers are against it, yet Congress has been forced to a vote on the Wages-and-Hours Bill.

Perhaps it's just as well to have a showdown on this proposal to put industry into a straitjacket. If it goes through there is not much hope for the efforts of Washington to revive private initiative. Anyone with half an eye can distinguish the paradox of trying to revive business and stifle it at the same time.

If Congress balks and refuses to obey orders from the Executive Offices, then there is hope for those of us who believe that our own individual mistakes are less dangerous than the ones sure to be made by an inexperienced central planning board in Washington.

We have now had five years of this sort of central direction based on laws written for an acquiescent legislature. Can anyone point to a truly successful law that has been passed during that period?

Is there any reason to believe that a new board or any existing bureau is capable of fixing wages and hours for the thousands of industries in this huge country? It would take supermen to do something that has been tried many times in other countries and never with success. Up to date we seem to have produced only one superman, and he has other things to worry about.

THE TRAGEDY of the situation is that many thousands of people are being paid substandard wages. New Jersey's labor commissioner reported only last week some two hundred thousand workers in that state who were getting less than nine dollars a week. But that is something for New Jersey to correct, not Washington. NRA showed us clearly what can happen when we try to get everything under control at once. The Labor Board's record is evidence enough of what we might expect of an independent administrative board.

Hours and wages present an age-old problem, one that cannot be settled by fiat. Evolution is a slow process but is making progress, even here. Let's stick to it, helping it along where we can.

Taxes and Machine Tools

Survey just completed shows severity of impact of undistributed earnings tax on a fluctuating industry and points to need for immediate repeal or modification

HOWARD W. DUNBAR
President, The National Machine Tool Builders' Association

A SURVEY OF THE machine tool industry just completed by the National Machine Tool Builders' Association reveals the fact that the machine tool builders without exception have found the tax on undistributed earnings a very severe handicap on their business. Whether the tax is paid, or a large percentage of the earnings is distributed to stockholders, the machine tool builder finds himself unable to set aside as a reserve as large a percentage as has been found imperative during past years.

Since this is a durable goods industry it suffers from extreme fluctuations in volume. To be accurate, the earnings of a machine tool builder should be measured only through a complete cycle of good and bad years. The capital and surplus of this industry were depleted 43 per cent during the years of 1929 to 1934. Unfortunately, it is not only the machine tool builder but his customer as well that cannot set aside the proper reserves, so that there is a doubly bad effect on this industry. The cost of the new machine to the user becomes the price of the machine plus the tax that the customer will have to pay at the end of that current year for having made the investment in new equipment. This tends to discourage the purchase of new machine tools greatly needed in industry.

Indequate depreciation

Another fact that has proved harmful to the machine tool builder and to his customers alike is the fact that the amount of depreciation reserves permitted by the Department of Internal Revenue does not cover the cost of purchasing new equipment that will replace the old. Depreciation reserves are only a return of the capital originally invested, but the present equipment costs more than the original equipment did because of the general increase in prices. To the amount set aside as depreciation over a period of years must therefore be added a sum from current earnings, if the equipment of the plant is to be kept relatively free of obsolescence.

The survey reveals that the tax forms an especially heavy burden on relatively small corporations, and as it happens, the machine tool industry is a group of relatively small companies. The typical machine tool shop employs about 500 men, has a capital investment of about $1,000,000. Avoiding the consequences of the tax by payment of dividends in stock dilutes the holding of the stockholder and builds up an additional burden on the future of the corporation which must pay dividends on such stock for an indefinite period into the future. The small corporation is also faced with the fact that it has difficulty in floating its issues if it attempts to sell stock.

As soon as business improves, the machine tool builder must put money into additional inventory, because of the greater volume of parts coming through the shop. Since the building of a machine tool requires from 3 to 6 months, and they are usually sold on terms of 30 days net, there is a considerable lapse of time (four to seven months) between the purchase of castings, ball bearings, motors, control, and the meeting of payrolls, and the earliest date when the account receivable is finally paid. Reserves in the form of cash are therefore not only necessary to bring a machine tool builder through a depression, but a supply of cash must be on hand when the depression ends in order to meet the demands of returning business.

All of the companies in the industry are deeply concerned with the extreme business importance of carrying through depressions the mechanics whose skill is essential in the manufacture of machine tools. Years of training and experience are required, and the men can not readily be replaced. During boom times the shortage of skilled men has been the limiting factor in machine tool production. Consequently, all machine tool companies carried a nucleus of skilled men through the depression, and some of them even borrowed money in order to do so. They must now pay a tax on the amounts paid against this debt at the bank.

Earnings are not profits

It is perhaps not realized by the general public that earnings are not the same as profits, that part of the earnings must be put aside in the form of capital assets if the company is to hold its place in industry. To the extent that this tax prevents the replacement of impaired capital, this tax is a tax on the capital structure of a company and to that extent is confiscation of the capital invested.

It is not generally realized that while a company's "surplus" is expressed in dollars, it is partly on hand in the form of material in process, parts in stock, and accounts receivable. But the tax must be paid in cash, and dividends must be paid in cash.

The tax on undistributed earnings puts the government in the position of Shylock, who not only demanded his pound of flesh, but insisted on taking it from Antonio's heart. It interferes with the best judgment of the manager, who is no longer free to take those steps which will insure the future of his company and give continuous employment to his men.

Will Ford Be Unionized?

Poor strategy by C.I.O. and practical working of Ford policies foreshadow union failure

BURNHAM FINNEY
Editor, American Machinist

NO C.I.O. VICTORY could be half so sweet to John L. Lewis as the unionization of the Ford Motor Company. The United Automobile Workers announced last spring that Ford was next on the list and President Homer Martin boasted that a signed Ford contract would be in the bag "before snow falls." Snow has fallen and the elusive Ford contract is still far from signed. However, the U.A.W. has inaugurated a drive to attempt to bring the individualistic Henry Ford into the columns of unionized employers.

To what extent is the U.A.W. succeeding? To find out the answer to this question we interviewed high officials of the Ford company, talked with union people and probed the thinking in automotive circles. Our conclusions have been put into question and answer form.

What chance of victory has the U.A.W.?

Very little. Not having anticipated the downswing in business and the growing conservatism of public opinion, the U.A.W. planned on tying up Ford at the start of 1938 production and thus wringing from the company a union agreement. The timing of the present campaign is bad. The union expected to cripple Ford by closing down outside assembly plants one by one, but this program has not worked out so well. St. Louis and Kansas City are still operating and it is Ford's intention to keep all plants running, whether strikes are called or not. Ford does not fear any attempt to stop production at its southern plants, such as Dallas and Atlanta. Union organization struck a permanent snag in the South when the C.I.O. began to unionize colored workers. That was too much for Southerners to stomach. If the worst should happen (and this is not expected), assemblies could be halted at all outside plants and Ford could continue to build 1600 cars a day in the assembly plant at River Rouge.

What is the status of organizational work at the Rouge plant?

No one seriously questions the fact that it is almost impossible for the U.A.W. to make much headway in the Rouge plant itself. Union officials refuse to reveal the membership there, but Ford claims that not more than 1000 out of 87,000 workers belong to the U.A.W. and not all of them are paying dues. A considerable percentage of these union workers are reported to be Poles. A union official declares confidentially that the difficulty of organizing a plant increases with its size. The expense of trying to sign up workers at their homes is prohibitive. They are hard to get hold of, because they often are out at the movies or somewhere else away from home. It becomes imperative, therefore, that organizational work be done while the men are assembled at the factory. Ford will not permit solicitation of union membership inside the Rouge plant and is eminently successful in enforcing that rule.

What is Ford's employment policy?

It has been Ford's habit to employ workers on the basis of the make-up of the community in which the factory is located. If a certain portion of the population is 40 to 50 years of age, Ford employs that same percentage. If 10 per cent of the population is of Italian extraction, one out of every ten Ford workers will be Italian. Lately Ford has modified this policy because it has found that the union secures members among the foreign-born with much greater ease than among Americans. Prospective workers most likely to get Ford jobs today are Americans between 40 and 45 years of age. Incidentally, Ford employs the blind, the crippled and the otherwise handicapped workers in proportion to their numbers in the community.

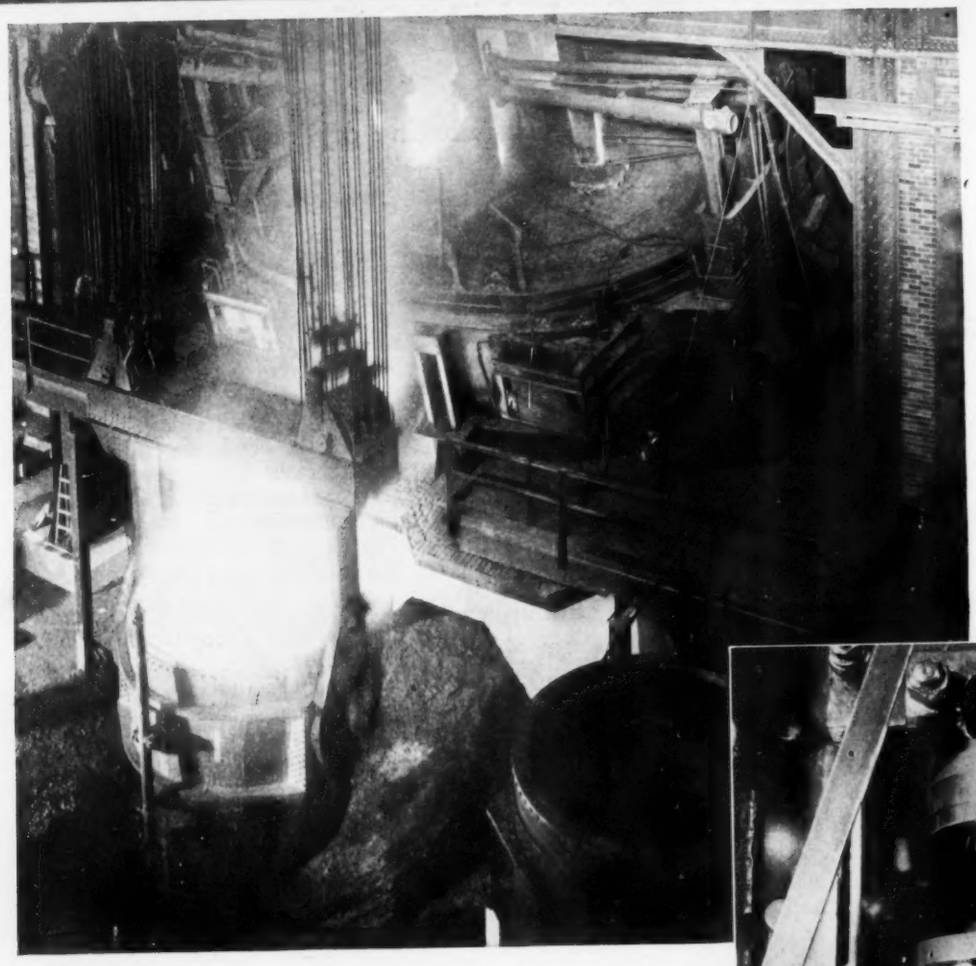
Are Ford workers dissatisfied?

The story that there is widespread dissatisfaction among Ford workers is largely a myth. As a matter of record, Ford's working force is perhaps the most stable in the automobile industry, partly because 50 per cent of the men are past 40 and have attained a maturity of judgment and have assumed family responsibilities not true of much younger men. Ford's experience shows that men between the ages of 20 and 25 are involved in more accidents than any other age group. That is because these youths are restless, haven't yet settled down and are just as apt to be thinking about the date that they had last night as about their work.

Ford has an efficient system for workers to air their grievances. A high Ford official likes to refer to it as "the safety valve." There is an office in each Ford plant to which any worker can go to protest against any alleged inequities in rates or about working conditions or to express his opinion of his foreman. He can do this without fear that word about his conversation will leak back to the foreman. No Ford foreman has the right to discharge an employee.

If the improbable situation arose that the union compelled an agreement with Ford, the winner would be the loser, according to a Ford official. By that we mean that Henry Ford would be likely to close up shop altogether and refuse further to operate his business.

Industrial Bearings by



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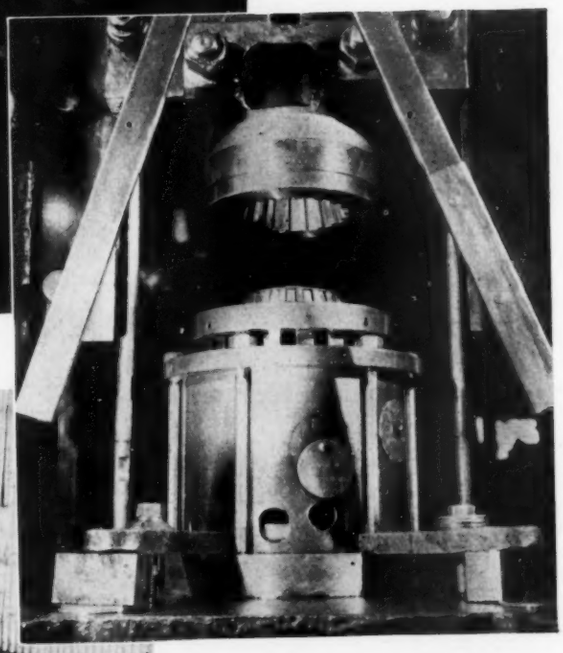

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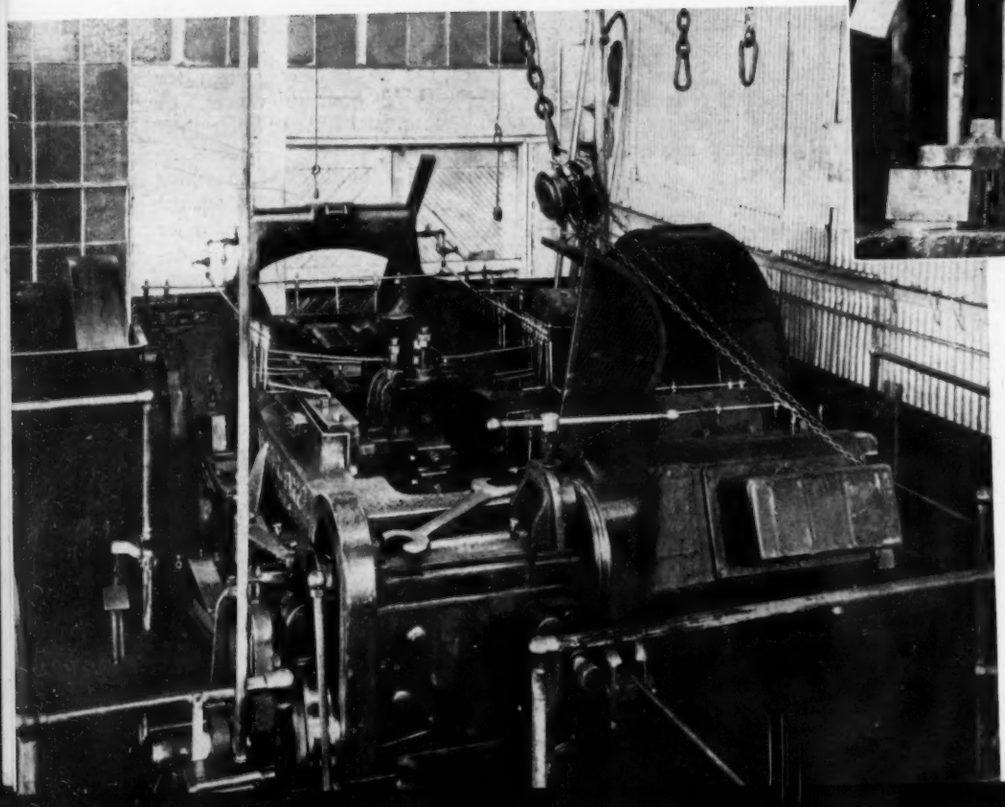


3

Timken

1 Steel for industrial bearings is produced in the world's largest electric furnace—capacity 90 tons

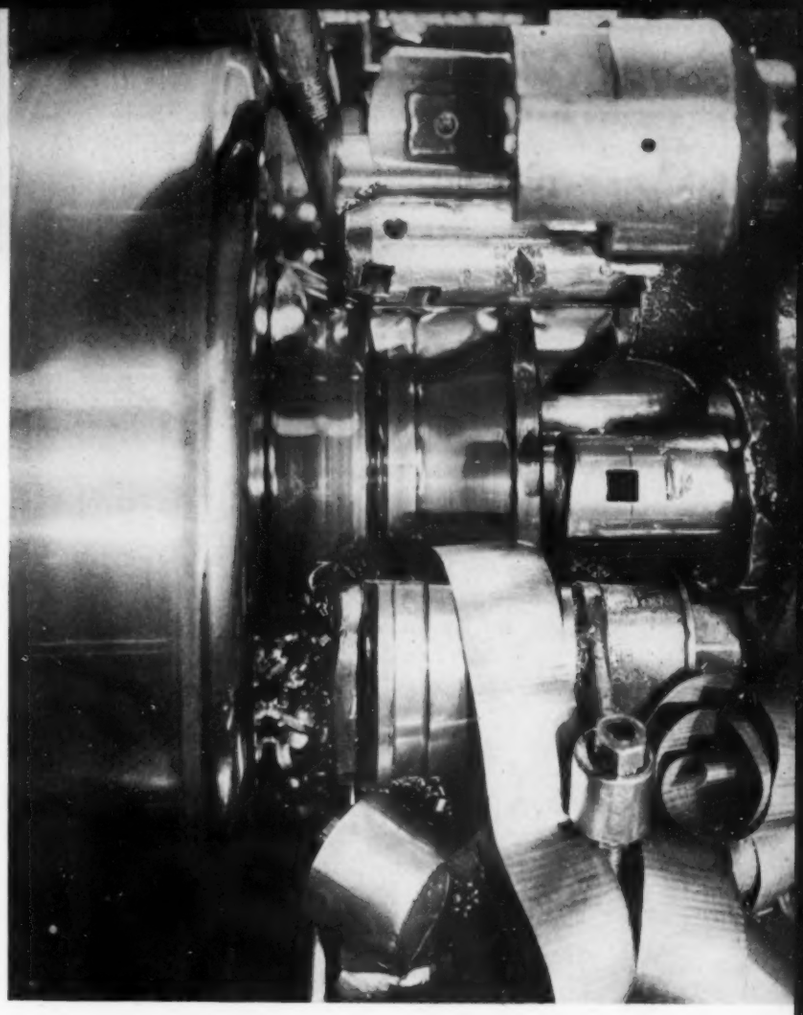
2 Special punch and die set for "winging" the cages that space the rollers in a tapered roller bearing

3 Tapered rollers are cold headed from rod stock under a 30-ton blow. Dies are handled by chain hoist

4 Cones are turned in a single-spindle automatic lathe from heavy wall seamless steel tubing

5 Bearing cups in process in a five-spindle automatic turret lathe

6 Tools in a four-spindle automatic backed away ready to commence a new cycle



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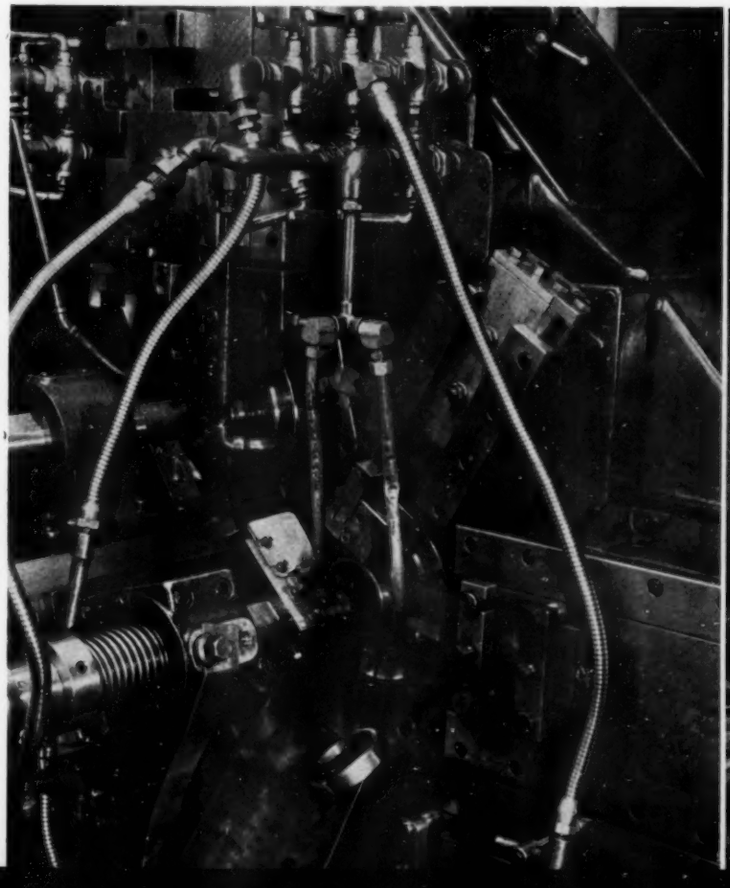
Photos courtesy Timken Roller Bearing Co.

5



6

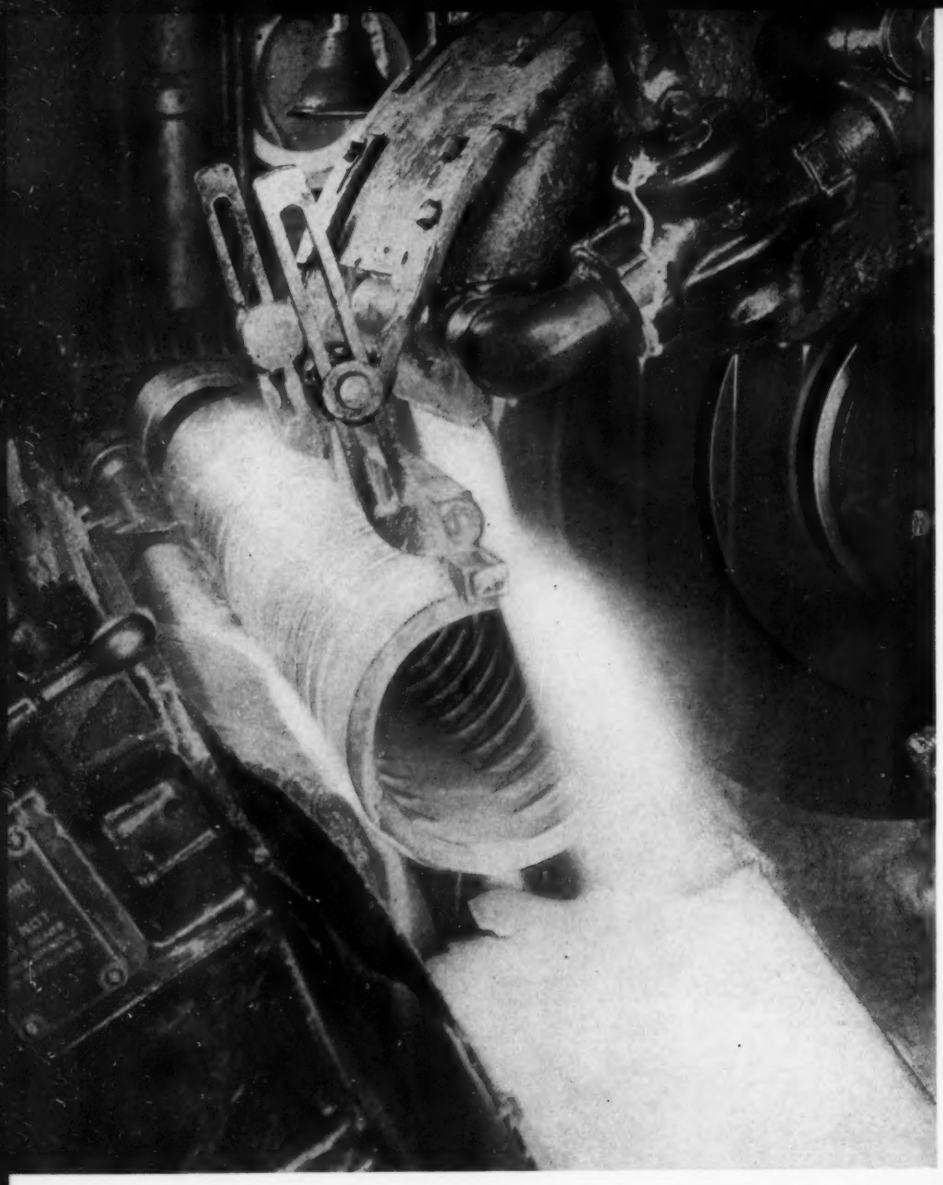
INDUSTRIAL BEARINGS

7 Cups advancing through a special centerless grinder

8 After turning bearing parts are hardened and quenched in oil. The fixture shown minimizes distortion

9 Carburizing of certain parts is done in vertical furnaces

7



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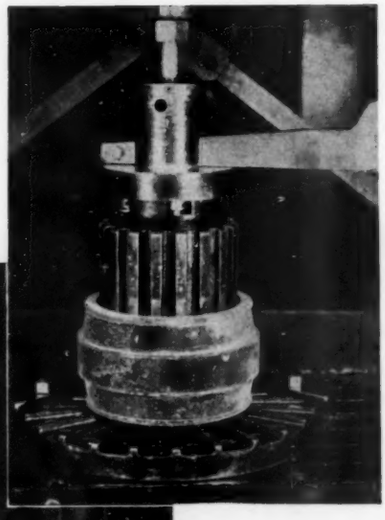


9

BY TIMKEN

10 Checking to tenths simultaneously for concentricity, width and taper

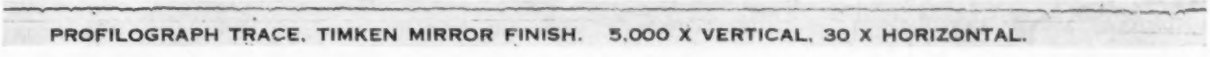
11 Profilograph record of commercially ground and Timken "mirror finish" surfaces

12 Done by mirrors and lenses. Checking to millionths by magnification of 5000 is possible in this Profilograph, first unit of its type

10

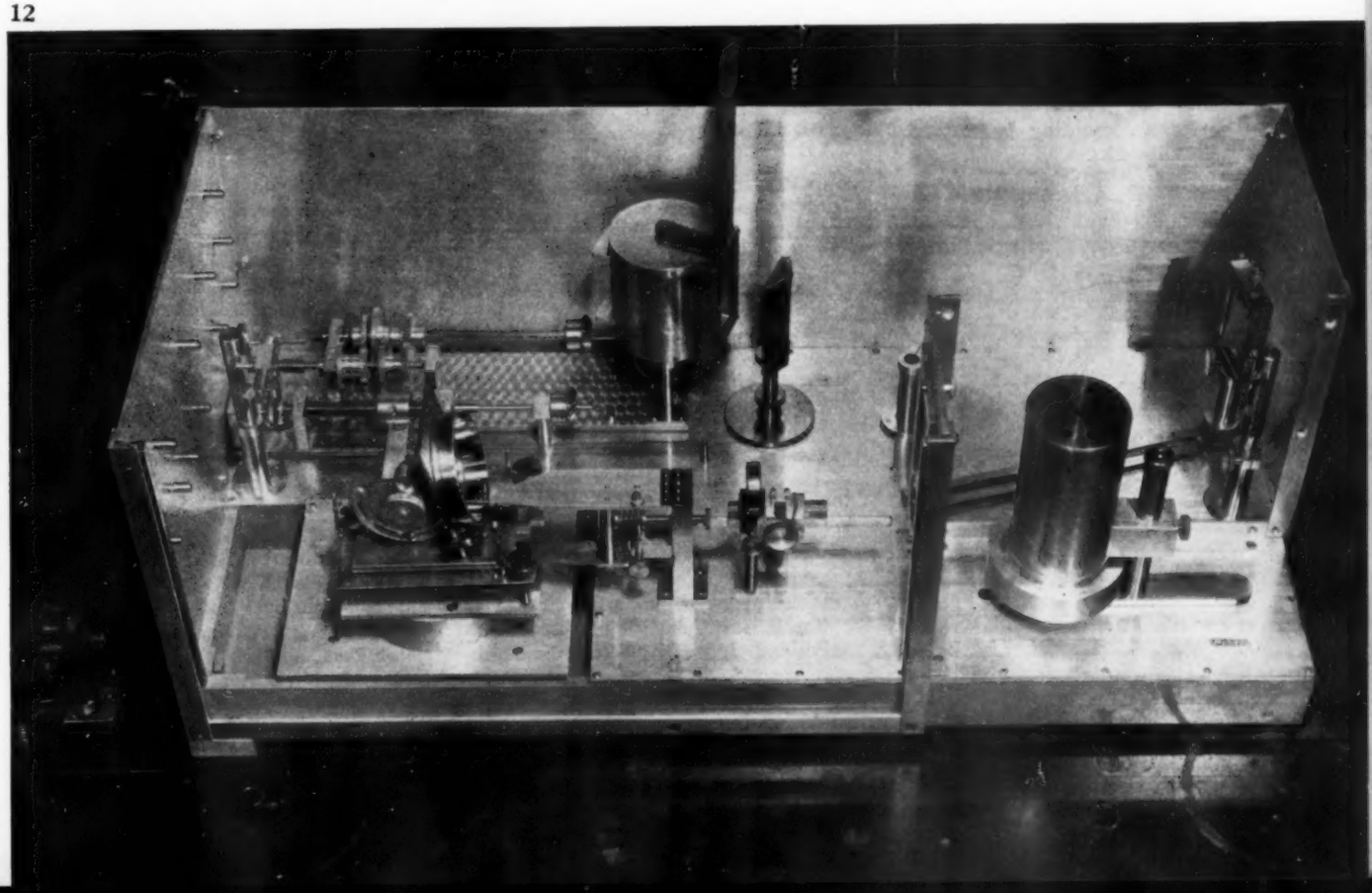
11

PROFILOGRAPH TRACE. GOOD COMMERCIALLY GROUND FINISH. 5,000 X VERTICAL. 30 X HORIZONTAL.



PROFILOGRAPH TRACE. TIMKEN MIRROR FINISH. 5,000 X VERTICAL. 30 X HORIZONTAL.

12



Simplified Machine Records

One card keeps track of machines in four plants and numerous branches, supplies machine information to four departments of this Canadian firm

F. H. HAM
Beatty Bros., Ltd., Montreal, Canada

SOME SYSTEM of permanently identifying and indexing each machine is necessary in industrial plants using a large number of units. The company with which the writer is associated manufactures a wide variety of lines including electrical household appliances, power pumps, windmills and farm equipment. It has hundreds of woodworking and metalworking machines of different kinds and sizes. In addition, there are all the machines associated with ferrous, and non-ferrous foundries and die casting. In planning an adequate index system to meet the somewhat unusual situation thus created the aim was to obtain reasonable completeness and yet keep the symtem as simple and nearly fool-proof as possible. Completeness demanded that there should be included in one file all the information that might reasonably be required by the purchasing and resale, plant maintenance, cost accounting and engineering departments.

Data Required

The purchasing department will ordinarily be interested in the initial cost of any given machine, the amount that has been spent in maintenance, and to a less extent in its production capabilities, all of which will influence its resale value. With this information at hand the value of new or used machines which competing companies offer for sale may be judged in the light of past experience, and the current trend of the machinery market.

The plant maintenance department is primarily concerned with the drive and mounting of the machine, its essential over all dimensions, weight, and anything else that may be met with during installation, servicing or removal.

The cost accounting department will want to know the class of work the machine will produce efficiently and the rate or speed with which it will do this. Finally, the engineering department is interested, for production designs should be such that may be economically produced on existing machinery to the greatest possible extent.

Concise Record

An index card has been found to meet the requirements mentioned above with reasonable conciseness. Technical details and characteristics of particular interest to production and maintenance are found on the front of the card. Cost details which are of interest to the accounting, purchasing or resale departments are kept separately on the reverse side of the card. It will be seen that sufficient information is included to quickly check or review the details of the purchase at either the purchaser's or the vendor's end.

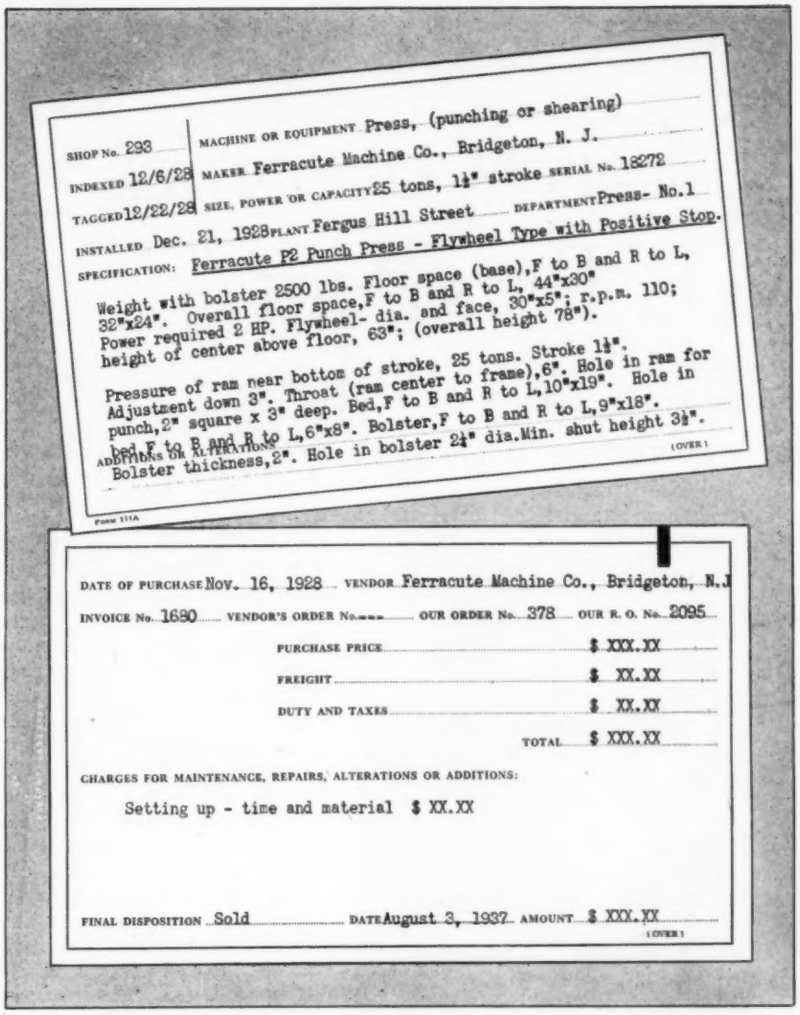
There are four large plants in our own organization, namely, the main plant where most of the assembly and metal working is carried out, the wood working plant, foundry, and die-casting plant. A distinctive card color is used for each of these four divisions, and a fifth color is used for machinery located in branches scattered throughout the British Empire, which is all purchased through the home office. An added visual reference is provided by small colored tabs fixed to the upper left corner of the index card. Tabs bear different colors for different classes of machinery, thus red for gear hobbers, blue for punch presses, etc.

Under normal circumstances the procedure adopted from the time a new machine is ordered until the time of its final disposal will be as follows:

On receipt of notice of shipment an order is issued to the receiving department and notification sent to plant engineering. When the machine actually arrives a thorough examination is made by the latter department to insure that specifications agree with the original purchase order after which the technical details and characteristics are filled out on an index card. One of a regular sequence of numbers is alloted to the new machine and this is stamped on a heavy brass plate which is sent to the plant maintenance department along with the instructions for installation. When the machine is set up and ready for production the number plate is attached to a conspicuous part and the front of the index card is completed by entering the date of installation.

Costs Noted, Too

Cost of installation and details from the invoice, which, incidently, is sent to the plant engineering division for formal approval, are entered on the reverse side of the card as shown in Fig. 1. The machine is then entered in the Index Record Book, and the card stamped to indicate date of entry. This record book is divided into four sections and quadruple cross indexing accomplished by classifying as follows:



SHOP No. 293 MACHINE OR EQUIPMENT Press, (punching or shearing)
INDEXED 12/6/28 MAKER Ferracute Machine Co., Bridgeton, N. J.
TAGGED 12/22/28 SIZE, POWER OR CAPACITY 25 tons, 1½" stroke SERIAL No. 18272
INSTALLED Dec. 21, 1928 PLANT Fergus Hill Street DEPARTMENT Press- No.1
SPECIFICATION: Ferracute P2 Punch Press - Flywheel Type with Positive Stop.

Weight with bolster 2500 lbs. Floor space (base), F to B and R to L, 32"x24". Overall floor space, F to B and R to L, 44"x30" Power required 2 HP. Flywheel- dia. and face, 30"x5"; r.p.m. 110; height of center above floor, 63"; (overall height 78").

Pressure of ram near bottom of stroke, 25 tons. Stroke 1½". Adjustment down 3". Throat (ram center to frame), 6". Hole in ram for punch, 2" square x 3" deep. Bed, F to B and R to L, 10"x19". Hole in bed F to B and R to L, 6"x8". Bolster, F to B and R to L, 9"x18". Bolster thickness, 2". Hole in bolster 2¼" dia. Min. shut height 3½".

ADDITIONS OR ALTERATIONS

(OVER)

Form 111A

DATE OF PURCHASE Nov. 16, 1928 VENDOR Ferracute Machine Co., Bridgeton, N.J.
INVOICE No. 1680 VENDOR'S ORDER No. OUR ORDER No. 378 OUR R. O. No. 2095

PURCHASE PRICE	$ XXX.XX
FREIGHT	$ XX.XX
DUTY AND TAXES	$ XX.XX
TOTAL	$ XXX.XX

CHARGES FOR MAINTENANCE, REPAIRS, ALTERATIONS OR ADDITIONS:

Setting up - time and material $ XX.XX

FINAL DISPOSITION Sold DATE August 3, 1937 AMOUNT $ XXX.XX

(OVER)

Front of index card supplies technical machine details for maintenance, production and engineering departments. Color of card indicates machine location

Details of purchase and disposal are filled in on back of card. Tab at upper right is colored according to class of machine

1. Maker of Machine
2. Type of machine (turret lathe, punch press, etc.)
3. Department
4. Number sequence.

All classifications, of course, refer directly to the index cards which are arranged in numerical sequence. Each of these divisions has been found to have a particular usefulness. The maker is important in that it permits rapid review of past transactions, and also simplifies the standardization of machine line ups or groupings. The index giving type of machine" is useful in that it shows at a glance those that are available for any given class of work and thus aids materially in arranging for resale or new purchases. Indexing by department has several obvious advantages which will readily suggest themselves, and the number sequence gives a convenient check on the relative ages of machines and also indicates those that have been sold. The index is made up in loose leaf binders of convenient size and one volume issued to each department concerned.

Final Disposition

From time to time as alterations, additions or repairs are made on the machine details in regard to their nature and cost are entered in the spaces provided on the index card. The last entry will occur at the time of final disposal either by scrapping or resale. The brass number plate is removed when the machine leaves the shipping department and is sent to the plant engineering division which obtains particulars in regard to sale from the resale department. After the last entry the card is again stamped and the index books called in to be brought up to date.

The system has the undoubted merit of providing needed information to the various parts of the organization interested. Yet it is simple enough that one department may be made responsible for its operation with a minimum amount of time and trouble. The great difficulty lies in switching to this unified system where there is either none or only a casual index system already in use. This must necessarily involve a tedious checking of old orders and invoices and examination of machine characteristics. Once, however, it has been brought up to date the system resolves itself into a few minutes work when each new machine is purchased.

Fatigue Tests of Butt Welds

Tests were made by Professor W. M. Wilson, University of Illinois, on ordinary structural steel plates ¾ in. thick that were butt welded; that is, adjoining edges of two plates were welded together. The welds were 6 in. long and were made either by hand, with flux covered electrodes, or by means of the carbon arc process. The fatigue testing machine—the only one of its kind in the United States—was capable of exerting loads of 200,000 lb. pull (tension), or push (compression). Professor Wilson varied the load on his specimens from zero to a maximum tension and calculated the fatigue strength from the test results, the fatigue strength being the load which would cause fracture on being repeated just 2,000,000 times.

Professor Wilson found that the fatigue strength of a butt weld, as made by the welder, was 30 to 40 per cent of the static strength of unwelded steel, and only about 25 to 50 per cent less than the fatigue strength of unwelded steel. The fatigue strength of the weld could be improved up to 25 per cent by smoothing the weld flush with the plate, by heat-treatment, or by hammering the weld metal while it is red hot. Actually none of the welded specimens was found to have a fatigue strength below 20,000 lb. per sq. in.

These tests go a long way toward providing designers with the authoritative data on fatigue strength for which there is urgent need.

From a paper presented at the eighteenth annual meeting of the American Welding Society.

Dr. H. N. Davis Becomes A.S.M.E. President

Annual meeting is marked by discussions on management, maintenance, technical papers and standards

MEMBERS OF THE American Society of Mechanical Engineers devoted a week crowded with technical sessions, committee meetings, plant visits, lunches, dinners and social events, to their annual meeting in New York. So busy was each day that it would be difficult to select a high spot that stood out from the many varied activities.

The meeting was formally opened by an address by James H. Herron, president, James H. Herron Company, Cleveland, Ohio, and retiring A.S.M.E. president. Mr. Herron reviewed the 1936 annual meeting, the semi-annual meeting in Detroit and the first fall meeting, held in Erie, Pa., under the new policy of holding four meetings each year. He pointed out that the four meetings planned for each year will "enable members of different sections to enjoy a Society meeting and will keep such members in close touch with Society affairs. A proper distribution of these meetings throughout the country will enable all members to have the same opportunity of attendance, at least once in two years."

Congratulations!—James H. Herron, retiring president, felicitates Dr. Harvey N. Davis who takes over the reins of the Society

For the management minded, sessions were held jointly with the Society for the Advancement of Management. Spencer Miller, Jr., Glenn Gardiner and G. S. Dierstein were speakers at the Management Division meeting held Monday evening. Dr. Lillian M. Gilbreth presided as chairman.

Mr. Miller, secretary and director of the Workers Education Bureau of America, speaking on "Labor's Attitude Toward Time and Motion Study," pointed out that labor's objection to time and motion study lies in the manner in which results are often used, rather than in the studies themselves. He cited examples to show that cooperation between labor and management in increasing industrial efficiency is well worth the effort.

Mr. Gardiner, assistant to the president of the Forstmann Woolen Company, claimed that time and motion study are necessary, "because we must remove guesswork from labor costs in order to be fair, both to the workers and to management." He agreed, also, that it is increasingly necessary to give more consideration to labor's needs and attitude.

Mr. Dierstein, of the Duncan Electric Manufacturing Company, discussed some of the main features of a properly conducted time and motion study program. He agreed, also, that continued cooperation between labor and management is essential to the best interests of both.

Unfortunately, J. Warren Madden, chairman, National Labor Relations Board, was unable to appear for his scheduled talk describing the work of the Board and the reasons for the Wagner Act. His place on the program was filled by Miss Eleanor M. Herrick, chairman of the New York Regional Board.

Problems in unionized plants were presented by H. B. Bergen, industrial relations counselor, McKinsey, Wellington & Company, and G. W. Taylor, Wharton School, University of Pennsylvania. A panel discussion was held on the topic "Practical Solution to Problems in Labor Relations."

Still another phase of management that received adequate consideration was the subject of apprentice training. Establishment of national standards for apprenticeship under the auspices of the Federal Committee on Apprentice Training is expected to lead to mobility for labor, protection of the employer who has given his apprentices sound preparation, and protection for people entering industry. William F. Patterson, executive secretary of the committee, said that such standards will grow out of scattered local apprenticeship systems. Local joint trade committees, of which there are about 1,200, are now functioning to

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determine the schedule of preparation needed for apprentices in their particular industry.

In addition, employers' associations and employees' organizations in many trades and localities are setting up apprenticeship systems with standards patterned after those recommended by the Federal committee. Thirty such local apprenticeship systems were established during the first six months of this year.

Developments in plastic molding equipment during recent years has culminated in the fully automatic machine. L. F. Rahm, assistant professor, Princeton University, traced the development of the different processes and equipment therefore, going back to the early Hyatt methods of 40 or 50 years ago. Mr. Rahm discussed preforming equipment, molds, hydraulic presses and mechanical presses. New designs have been evolved through the demand for larger capacities in preforming machines, tilting head presses and injection machines. It has been found that operation of preforming machines has been improved by variable speed transmissions, allowing compensation for the variation in tabletting properties of various machines. Welded steel frames have permitted increasing the size of semi-automatic presses, appearance has been improved by inclosure of the mechanism and incorporation of self-contained pumping units. Such units offer many advantages in installation.

Mr. Rahm stated that most interest in press equipment centers now in the injection molding machine developed to handle thermoplastic materials. Foreign machines lag far behind American machines today both in respect to size of shot, and quality of construction. New models of considerable size will use 6 and even 8 oz. of material per shot; heat 50 or more pounds of material per hour and provide for 40 or more square inches of injection area.

Harry Burrell, of the Ellis-Foster Company, described molding materials with respect to chemical type and various physical properties.

In a paper on "Mechanical Design of Plastic Parts" D. M. Buchanan, Bakelite Corporation, observed that there is a tendency, particularly in using thermo-setting materials, to economize on wall sections. This is false economy both in

Dr. E. J. Abbott, Physicists Research Company, demonstrates his 50-lb. portable profilometer for instantaneous measurement of surface roughness

There's a laugh even in technical sessions; at least B. P. Graves, Brown & Sharpe, and F. J. Kampmeier, Ingersoll Milling Machine Company, find one

One report serves for two—T. F. Githens, Cleveland Twist Drill, and F. R. Walters, Westinghouse, seem to find it absorbing

New chairman of the Sectional Committee on Small Tools and Machine Tool Elements, W. C. Mueller, of Western Electric, catches up on his reading

Standard work makes headway under the efforts of J. H. Horigan, Union Twist Drill Company, and W. L. Barth, General Motors Corporation

percentage of rejects and breakage in assembly, shipping or use. He suggested a minimum wall thickness of 3/32 in. for the average box and $\frac{1}{4}$ to $\frac{3}{8}$ in. for radio cabinets, clocks and office equipment. Proper rib construction will permit freer flowing of materials as the ram closes, as well as stiffening the part. A 3-deg. draft facilitates ejection of the piece. Tolerances of $\pm$ 0.002 in. can be maintained on dimensions perpendicular to the line of molding pressure, but $\pm$ 0.005 in. is more practical. Tolerances of $\pm$ 0.010 in. are preferred on over-all dimensions parallel to the line of molding pressure.

General use of plastics for decorative purposes is less than ten years old, according to Robert J. Hill, of the Gorham Company. He believes that the materials manufacturers, by encouraging a cheap market, are responsible for a certain lack of public appreciation of plastics as a dignified material for objects of beauty. In his opinion the plastics manufacturer must study the public's capacity for artistic understanding and acceptance, and the designer must be sensitive to things that have a general appeal.

Under the auspices of the Machine Shop Practice Division two addresses were made on the evening of December 6. Production methods for finishing metal surfaces may well be modified to secure greater economy or more desirable characteristics, according to E. J. Abbott, of Physicists Research Company, through the use of the profilometer. Development of the instrument was undertaken some time ago at the instance of the SKF industries, which was interested in better bearing surfaces. Dr. Abbott traced the development of the profilometer and demonstrated a commercial model such as now used in glass plants and automotive factories for controlling surface finish. He said that clients have used the instrument to study the effect of grinding and honing time on cylinder bores, for example, and also the efficiency of competitive abrasives. These studies have led to considerable changes in shop practice, and savings of time have been as high as 50 per cent.

Malcolm F. Judkins, chief engineer of the Firth-Sterling Steel Company, gave the step by step procedure for correct grinding of carbide tipped tools. He emphasized the precautions to be observed particularly in finish grinding. For example, he said that grinding checks will most certainly occur if the wheel is permitted to dwell at any point on the tool. In his opinion, finish grinding is best accomplished on a diamond wheel grinder, and ultra-smooth surfaces require lapping on a cast-iron disk charged with diamond dust.

About 50 members registered in the Machine Shop Practice Division met with the members of the executive committee of the division at a luncheon where E. P. Bullard, president, Bullard Company, and recipient of the A.S.M.E. medal, was the guest of honor. The meeting was in charge of George F. Nordenholt, editor *Product Engineering*, chairman of the division, and Mr. Bullard was introduced by Kenneth H. Condit, editor *American Machinist*, and a manager of A.S.M.E.

Mr. Bullard mentioned a few of the changes that have occurred in shop practice since he first entered the shop, and advocated the training of methods engineers who would be expected to become familiar with new methods and apply them to problems in their own plants. These men should be engineers with sufficient shop background to qualify as master mechanics, but should not be loaded up with any of the master mechanic's regular responsibilities.

The executive committee of the Machine Shop Practice Division organized by reelecting its officers, George F. Nordenholt, chairman,

A.S.M.E. Honors

Holley Medal

Frederick G. Cottrell
Research Associates, Inc.

A.S.M.E. Medal

E. P. Bullard
President, Bullard Co.

Warner Medal

Clarence F. Hirshfeld
Detroit-Edison Co.

Melville Medal

Alfred J. Buchi
Buchi Syndicate, Switzerland

Junior Award

Leslie J. Hooper
Worcester Polytechnic Institute

Main Award

Allen P. Stern
Case School of Applied Science

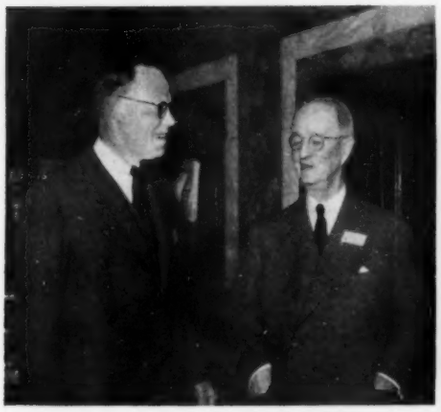
Student Award

Gino J. Marinelli
Rensselaer Polytechnic Institute

Carbide-tipped tools are described by M. F. Judkins, chief engineer, Firth-Sterling Steel Company

Two milling machine experts talk it over—Sol Einstein, Cincinnati Milling Machine Company and J. B. Armitage, Kearney & Trecker

J. R. Weaver, Westinghouse, and John Cetrule, Triplex Machine Tool Company, enjoy lunch between sessions and committee meetings

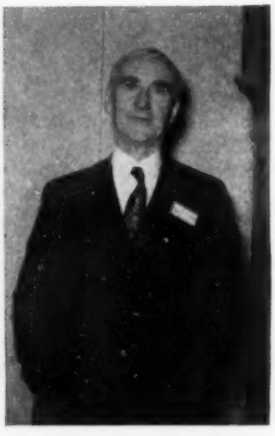


Kenneth Condit (left) introduced E. P. Bullard (right) at the luncheon given in his honor by the Machine Shop Practice division

R. E. W. Harrison, Chambersburg Engineering Company, hides behind his inevitable pipe, but can always be seen at the meetings of five committees

E. J. Bryant, Greenfield Tap & Die, and L. F. Nenninger, Cincinnati Milling Machine, have a common interest in standards

Prominent in committee work are S. McMullan, Western Electric Company, and F. S. Blackhall, Taft-Peirce Mfg. Company



After years of work for the Society, Past-President Dexter S. Kimball, dean emeritus, Cornell University, is still hard at it

and James R. Weaver, secretary. Mr. Nordenholt is editor of *Product Engineering* and Mr. Weaver is director of equipment, inspection and test, Westinghouse Electric & Manufacturing Company, East Pittsburgh. A. N. Goddard retired from the committee at the end of his term and his place was taken by Erik Oberg, editor of *Machinery*. The other members are Bernard J. Tang, general superintendent, General Electric Company, Schenectady, and A. M. Johnson, vice president and chief engineer, Barnes Drill Company.

W. O. Lawson, plant engineer, Plastics Division, E. I. du Pont de Nemours and Company, in his talk at the maintenance luncheon, stated that elimination of waste motions, reduction in time lost by workmen between jobs and going to distant storerooms, and better planning will do much to reduce maintenance costs. He pointed out that "present conditions impose an additional load on the maintenance organization, since any increased cost must be absorbed in the selling cost of the product."

"There is no such thing as a run of bad luck," according to A. C. Windle, plant engineer of the Colgate-Palmolive-Peet Company. Maintenance work that is so frequently called 'bad luck' is only work that should have been foreseen and taken care of before the breakdown occured. He also pointed out that a proper stock of spare parts is essential for economic operation.

J. I. Thompson, plant engineer of the Bristol-Myers Company and the third speaker at the maintenance luncheon, outlined the control system that has been developed by his company for maintenance activities. Planned schedules are developed at a weekly conference and are posted so the workmen will know what jobs they can expect during the week.

At the Society's annual dinner held on the evening of December 8, nine 50-year members were honored. Mr. Herron, who presided, spoke on "Professional Unity." He was followed by Dr. Earnest A. Hooton, curator Peabody Museum, Harvard University, who talked on "The Simian Basis of Human Mechanics, or Ape to Engineer."

There were 24 committee meetings on the standardization of tools, measurement, piping, rivets, bolts, bushings and other items, including one on surface quality that is attracting considerable attention. A new committee for the standardization of reamers met for the first time.

Machine tapers standards are still under consideration. Self-holding tapers, which particularly concern drill shanks, include three of Brown & Sharpe, five of Morse, to which the intermediate size of 4½ has been added, and a new, larger series with a ¾ in. taper per foot. The new 4½ taper is proposed as ⅝ in. per foot, which is what the Morse taper was supposed to be.

Standard nomenclature is being carefully considered by a special committee in order to help overcome misunderstandings due to the variety of terms used in different localities.

Plant visits available to members during the week included trips to the French Line S. S. Normandie, the experimental towing tank for determining hull design at the Stevens Institute of Technology, Waterside Station of the Consolidated Edison Company, the World's Fair site and Ward's Island Sewage Disposal Plant, power plant of R. H. Macy & Company, Rockefeller Center and ventilating equipment Lincoln Tunnel at 39th Street.

Electric-Furnace Brazing—I

Uniform, tight and clean joints having relatively high strength are possible when furnace-brazing is performed according to approved methods

H. M. WEBBER
Industrial Department, General Electric Company

IN THE electric-furnace-brazing process assemblies are put together with brazing-metal, such as copper wire, applied near the joints. The assemblies are then passed through an electric furnace in which a reducing atmosphere prevents oxidation of the metals and frees them from any already-formed oxides, thus preparing the surfaces to be wetted by the molten brazing metal. Then, as the melted brazing metal flows on the surfaces, it is drawn into the joints by capillary action. There it forms alloys with the body metals.

These alloys, while solidifying upon transfer of the work to an adjoining, controlled - atmosphere cooling chamber, develop considerable strength. Here the temperature of the assemblies is reduced to a point at which it is safe to bring them in contact with the outside air. In this manner the parts are delivered from the furnace with tight joints and clean, unoxidized surfaces.

Fig. 1 illustrates the manner in which a typical assembly is prepared for electric-furnace brazing and how the brazing-metal flows through the entire joint, forming a strong film of alloys with the body metal. Here a copper-wire ring, *A*, is placed over a steel shaft, *B*, which is to be brazed to a steel flange, *C*.

Smooth Fillets Formed

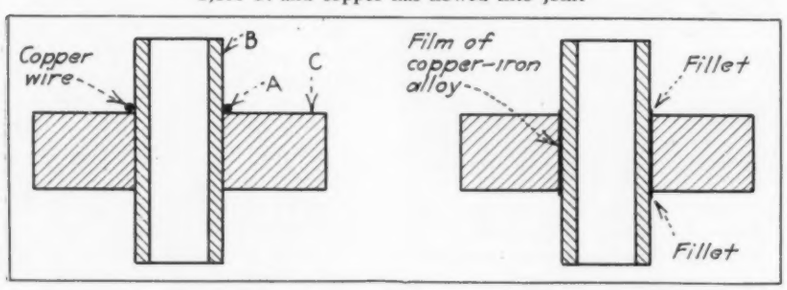
After being heated to 2100 F. in a controlled-atmosphere electric furnace, the copper will flow into the clean, tight joint by capillary attraction, forming a copper-iron alloy film in the joint. Smooth fillets form at *D* and *F* after the metal flows. Resultant strength of the bond can be controlled by varying the area of the joint.

Where electric-furnace brazing has been adopted to replace or augment other methods of assembly, it has generally resulted in one or more of the following benefits: (1) increased life of assembly and reduced service costs made possible by resistance of such a joint to vibration and impact, (2) reduced production costs because of savings in time, material, weight and space requirements as well as reduction of inspection rejections, (3) strength at high temperatures resulting from high melting point and thermal conductivity of the brazing metal, (4) uniform tightness of the joints, (5) little or no distortion because joints are free of localized strains, (6) clean, bright appearance and smooth fillets, (7) high possible production rate, and (8) ability to join unlike metals, such as high-carbon or alloy steel to low-carbon steel.

The "muffle-box" assembly for refrigerating machines, two of which are shown mounted on an auxiliary brazing fixture in Fig. 2, was formerly torch-brazed. All five joints are now electric-furnace brazed in a single trip through a mesh-belt conveyor-type furnace. Leaking joints, formerly experienced because of the irregularities of manual brazing, are now practically unknown and manufacturing cost has been reduced about 30 per cent. More than 250,000 of these sub-assemblies have been furnace-brazed and tested with 200-lb. air pressure; not a single leak has been found. A cleaning operation to remove oxides and flux has been eliminated.

There are a number of cases where important cost reductions have been made by substituting the electric-furnace brazing of component parts for the machining of an object from solid stock. The cost of setting up, machining and waste material is often appreciable, particularly when compared with the low cost of punchings, stampings,

Fig. 1—Steel assembly with clean, tight joint before and after being copper-brazed in an electric controlled-atmosphere furnace. At left, copper ring placed in position. At right, appearance of joint after heating 2,100 F. and copper has flowed into joint



or screw-machine parts which can be assembled with tubing or bar-stock by furnace-brazing.

Small gears, cams and levers have been simply pressed on shafts and the joints furnace-brazed with resultant saving in time and cost. Several milling operations have been eliminated by furnace-brazing feed-roll supports for automatic welding heads with a cost reduction of about 40 per cent. The support, formerly machined from one piece of steel, is now made by pinning together pieces of standard sizes of cold-rolled bar stock. Contacting surfaces are ground to remove the skin formed in rolling. This is to assure good wetting action by the brazing metal, which is applied in the form of copper-powder paste.

A number of the leading business-machine manufacturers and at least three manufacturers of sewing machines are furnace-brazing many parts formerly torch-brazed, riveted or pinned. Cash registers, adding machines, bookkeeping machines and similar units operate several million times during their lives and the small working parts are subjected to severe stresses, impacts and vibration. Similarly, a number of types of industrial sewing machines operate at speeds in the neighborhood of 4,000 to 6,000 r.p.m., subjecting many of the severely stressed sub-assemblies to considerable destructive vibration.

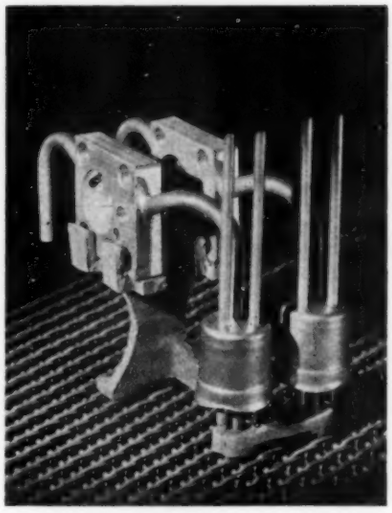


Fig. 2—"Muffle-box" assemblies are now furnace brazed with a reduction in cost and improvement in quality. The five joints are brazed in one pass through an electrically-heated furnace

It has been found that electric-furnace brazed sub-assemblies have many times the strength of similar parts fabricated by pinning or riveting. Such units do not work loose, as did many of their predecessors, and much can be saved in production and service costs.

Comparative strength tests have been made on a large number of parts to determine relative strengths obtained by the old and new methods. Data shown in the accompanying chart, Fig. 3, are typical. It will be noted that the ultimate strengths of typical steel assemblies, formerly pinned or riveted and now furnace-brazed with copper have been increased 52 to 287 per cent. This means that the parts have longer life and they can be built with lighter and smaller sections, thus reducing inertia and space requirements. Cost savings effected by use of the electric-furnace brazing process run, in general, from 30 to 90 per cent of the former costs when drilling and pinning cash-register assemblies.

Fig. 4 shows a copper-brazed steel-fin condenser for refrigerators. The fins are cupped and punched from strip steel and the stampings are then pressed together, forming tubes within themselves. No tubing is used except for the two short connectors on one end. Condensers of this type are built to withstand service at high temperatures and high internal pressures.

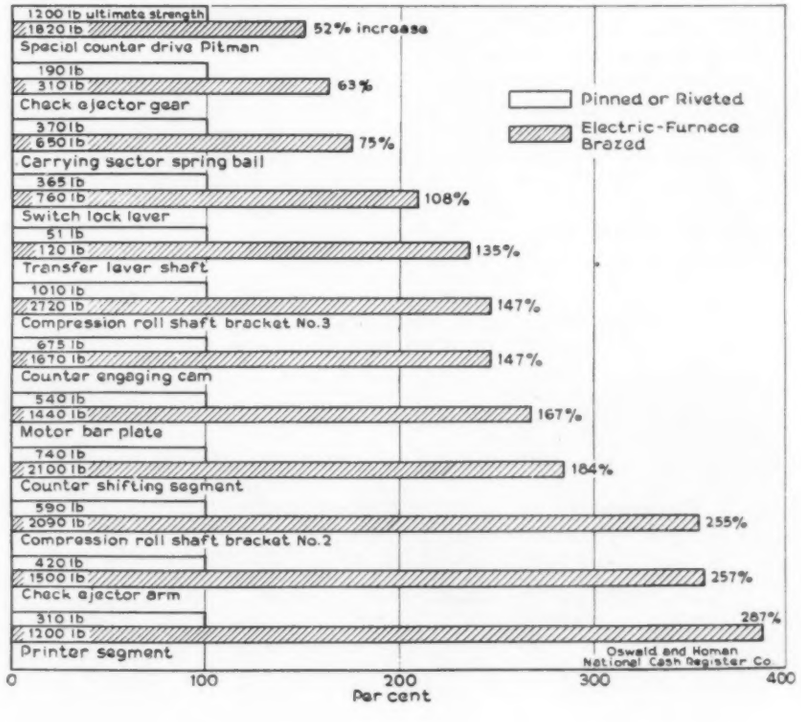
Similar units were formerly made by dipping in a bath of soft metal and sweating the joints. Obviously they were limited in their application because of the low melting temperature and low strength of the bonding metal.

Electric-furnace brazing has made possible the development of a number of completely new products which would be difficult or impractical to make any other way. Typical of these is the copper-brazed core for an automobile hot-air heater shown in Fig. 5.

These cores are made of steel stampings which are copper brazed together. After the brazing operation, sheet-steel jackets are assembled around the cores to provide a chamber through which air is forced.

Welding of headers to the ends completes the assembly. Exhaust gases, passing from the engine to the muffler, give up their heat to the core. This is picked up by air passing over the shell and is carried into the car. Copper-brazed joints give good heat transfer and are tight and strong.

Fig. 3—Comparison of strength of pinned or riveted cash-register parts with similar parts assembled by copper-brazing.



Holding Assemblies for Brazing

Relationships of the parts put through a brazing furnace must be maintained from start to finish. The method of holding the assemblies together, the design of the joints and the means of applying the brazing-metal are all closely related.

One of the most important things

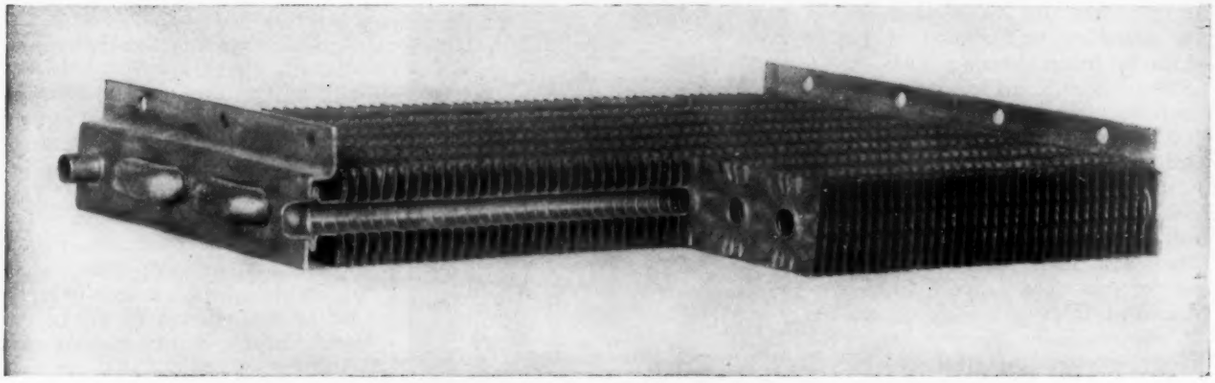


Fig. 4—This condenser unit has 729 joints, all of which are furnace-brazed. Only twelve leaks were found in a production lot of these units having a total of 660,000 joints.

to remember in furnace-brazing is the force of gravity. Assemblies have a tendency to fall apart after they become heated and joints are loosened by expansion. Also, brazing-metal tends to flow downward more readily than in any other direction. It will creep horizontally or upward on the metal surfaces, but will flow downward freely and will collect at low spots if applied in excess quantity.

Design of an assembly to be furnace-brazed should be such as to best meet the requirements of the operation. The assembly must be such that it will remain assembled in the furnace, brazing metal must be directed into the joints to the best advantage and the arrangement must give minimum distortion of the parts.

The most common method of assembling parts for furnace-brazing is to press them together, using a sleeve fit. Staking can be used to maintain correct position of the mating parts. Spot-welding, tack-welding and pinning also are used to obtain the same result.

Joints cannot be made too tight for copper-brazing steel assemblies, but increased tightness usually requires increased heating time to permit the copper to flow all the way through. A good rule to follow is to allow about 0.001 in. per inch of diameter as the maximum permissible press fit for such joints. When brazing with lower-melting point alloys, particularly on nonferrous assemblies, it is sometimes desirable to have a small clearance within the joint to permit the best flow of the brazing-metal.

Straight-knurling of the male member is sometimes resorted to in order to obtain an inexpensive snug fit. With this arrangement wide tolerance can be used on both the shank and the hole.

An inexpensive and effective method of assembling spuds in holes in hollow bodies is to swage them into place. The advantage of this method is that close tolerances do not have to be held on the tenon or the hole because the swaging operation forces the parts into the intimate contact necessary for furnace-brazing.

Where the diameter of a hole in an assembly must be held accurately, as in the case of a hub fastened to a lever, spinning in a riveting machine is commonly resorted to. Another method of accomplishing the same result is to flare the tenon in a press. For such work tolerances must be held closely in order to insure uniform, snug fits.

Other Methods Used

Peening and crimping are often used in order to insure intimate contact of component parts. Likewise, riveting frequently proves an effective means of holding parts together for furnace brazing. Blades in fan-wheels that are to be operated at high speeds are now assembled in this manner. Formerly the blades, riveted to supporting rings, gave trouble by working loose.

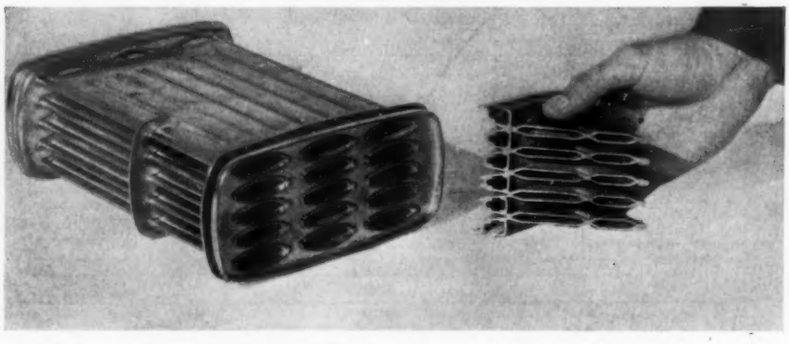
Various other methods, such as wedging, drawing parts together with screws, winding on tubes, using interlocking joints and clamping have been successfully applied to specific jobs. Clamps usually have to be scrapped after each usage. They also expand as they heat up and a clamp drawn tight when cold may not hold when raised to copper-brazing temperatures.

Auxiliary fixtures, similar to that shown in Fig. 2, are sometimes used to properly support assemblies on trays or conveyors. Supports made of strip and wire usually consist of alloys containing 80 per cent nickel and 20 per cent chromium while cast supports are made of an alloy containing 35 per cent nickel, 15 per cent chromium and 50 per cent iron.

When heat-resisting alloy conveyors or trays are employed, which generally develop a protective film of chromium oxide in use, it is satisfactory to rest the assemblies directly upon them. There is little chance of assemblies becoming brazed to these alloy members. Where steel trays are used, it is desirable to cover them with thin asbestos sheets.

This article will be concluded in an early issue.

Fig. 5—Copper-brazed core for automobile hot-air heater, a new product easily fabricated with this process



TALKING SHOP

Belt Drives for Fine Work

The energy that has been expended in discussing the pros and cons of group drive would go a long way in reducing the power cost in any plant. Years ago the Bullock Electric Co. put an individual motor on every machine in its Norwood, O. plant. That was before it was absorbed by Allis-Chalmers. While this installation of individual motor drive was done as an advertisement and was ahead of its time, the idea grew rapidly—too rapidly in the minds of some plant managers and engineers. For some of these men still feel that the group drive has advantages in their work.

The Ahlberg Bearing Co. of Chi-

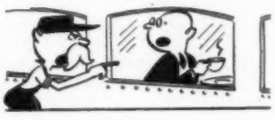
cago is an example of this. Their chief engineer, B. S. Ohner, sets up the race grinding machines in groups of eight, using a 10-hp. motor for the group. These machines consume only 1¼ hp. each. Larger machines, using over 2 hp. each are set up in groups of four, with a 15-hp. motor. He finds that power transmitted to the machines by belts of uniform thickness give more satisfactory ball races than when driven in any other way. We know of shops doing precision lathe work who feel the same way.

Relative Savings

In one shop where the boss gets around often and knows his men pretty well an economy program was instituted. Everyone was asked to save whatever he could, and to try to think up new ways of economizing.

On one of his trips through the shop the boss was stopped by one of the old timers who wanted to discuss economy. "I'm doing my part," said the old timer. "Every noon I turn out all the lights while the boys are out at lunch or playing soft ball. I figure it saves quite a bit. You remember you said if everybody saved $2.95 apiece that would mean one per cent on the payroll." "That's fine," said the boss. But the old timer hadn't finished.

"It's hard for me to save very



much," he protested. But it's easy for you."

"How?" asked the boss.

"Well, I saw you eating breakfast in the diner last Wednesday when the New York train stopped at the crossing. You could have saved most of that by having a cup of coffee and a roll at Mary's, the way you used to when you were in the shop. And think all you'd save if you didn't ride in those expensive Pullmans. No, it's a lot easier for you to save than it is for me."

Hidden Flaws

Based on the principle that any substantial change in the constitution or state of magnetizable material will be reflected in its magnetic characteristics, a new method of inspecting machine parts discovers hidden flaws without injuring or changing the part. In this method, developed by one of the large electrical manufacturing companies, a constant magnetic field is produced so that it penetrates through the entire thickness of the small area of the part to be inspected. The part is then slowly revolved so as to change continuously the section within the field, until the whole part is magnetically explored. Imperfections, such as voids or non-homogeneous areas, in the interior betray themselves by producing disturbances in the magnetic field at the surface of the part. Magnetic search coils are mounted close to this external surface. Any change in the magnetic linkage, created by a discontinuity in the metal of the part, produces a corresponding, sudden electric voltage in the external measuring circuit.

She Got the Job

Women toolmakers are rare in any line of machine work. So we were interested in finding one in the tool room of a good sized shop a few years ago. And the super assured us she was a darn good toolmaker at that.

"The foreman didn't want her at all. He's a rough spoken chap but a mighty good man. And he protested vigorously, and in picturesque language, against having a woman in his tool room." So of course we

wanted to know how she came to be there.

"Well, it was this way," he said. "We insisted that he see her and interview her at any rate, and not to be too rough on her even if he didn't hire her. He saw her, interviewed her and hired her. She out-cussed him!"

Corrosion in Transit

Several machinery builders are complaining of trouble with corrosion that spoils finished surfaces while the machine is on its way to the customer. No matter how carefully the surfaces are protected something happens to one or two machines out of perhaps fifty shipped. The corrosion manifests itself as a gritty deposit that forms on one or the other of two mating surfaces, and results in ruinous scratches if it is not discovered before the machine is started up. Obviously the customer is not going to take a complicated machine apart to make sure that all is well with hidden sliding surfaces. He expects them to be right when they leave the factory, and right when they reach him. If anyone knows the answer to this problem he will be doing a service by telling what it is.

The Editors.

Small Punchings in a Continuous Stream

Five exceedingly small parts are punched and blanked per second in a compact special, solenoid-operated press

GEORGE J. MURDOCK
Murdock Research Laboratory

THERE IS a better way to produce extremely small accurate parts than in sub-press dies mounted in a power press. Faster production and automatic operation can be secured from a combined electrically operated press, punch and die. The entire equipment can be very small and need occupy only a small amount of bench space.

What caused development of this equipment was the rather minute part shown in connection with Fig. 1. Actual size of the blank is 0.200 in. long, 0.025 in. at the wide end, 0.010 in. at the narrow end, and the hole is 0.025 in. in diameter. Obviously, it would be very difficult to make a small combination punch and die to the accuracy required. So an electrical instrument manufacturer, who required this piece, applied his electrical knowledge to building a special compact machine.

The press has a cast-iron base supporting four pillars that in turn carry the brass plate *A*. At *B* is a solenoid energized through binding posts above. The minus terminal is insulated from plate *C*, and is connected to the outer coil of the solenoid. The positive terminal is grounded on plate *C*, which supports the automatic plunger-operating switch *D*. Contact *E* in the switch is connected with the first turn of the coil, the wire passing through an insulating bushing in plate *C*. A top view of this plate, Fig. 2, shows various parts of the switch in greater detail.

With these connections, the top of the solenoid will have north polarity and the bottom will have south polarity. A magnetic circuit is formed that nearly doubles the ordinary pull downward of plunger *F*. This member slides freely in the brass tube on which the coil is wound. The magnetic circuit mentioned is strengthened by the sliding rods *G* that are connected to plunger *F* by the top yoke.

Lower member *H* is a tight fit in the brass tube and has a flange that is fastened with screws to *A*. Member *H* is made from tool steel and is soft except for the lower end which is hardened and ground.

Plunger *F* is thrown to the upper position by a coil spring. Upward travel of the plunger causes the switch to close, because the yoke contacts adjustment nuts on the switch-actuating lever. Thus, the press is always normally in the starting position, provided the circuit to the binding posts is open. A pedal switch or a push-button may be actuated when the press is to be run.

Plunger movement is controlled by adjustable collars on the sliding rods *G*. These collars strike soft rubber cushions that not only contribute to noiseless operation but prevent movement of the collars arising from a pounding action.

Fig. 3 is a section of the die nose *I* that is pinned to the lower end of the sliding rods. Besides carrying the blanking die, the nose also actuates the automatic feed through an arm *Q* attached to its side. The plunger *H* is a sliding fit in the die nose.

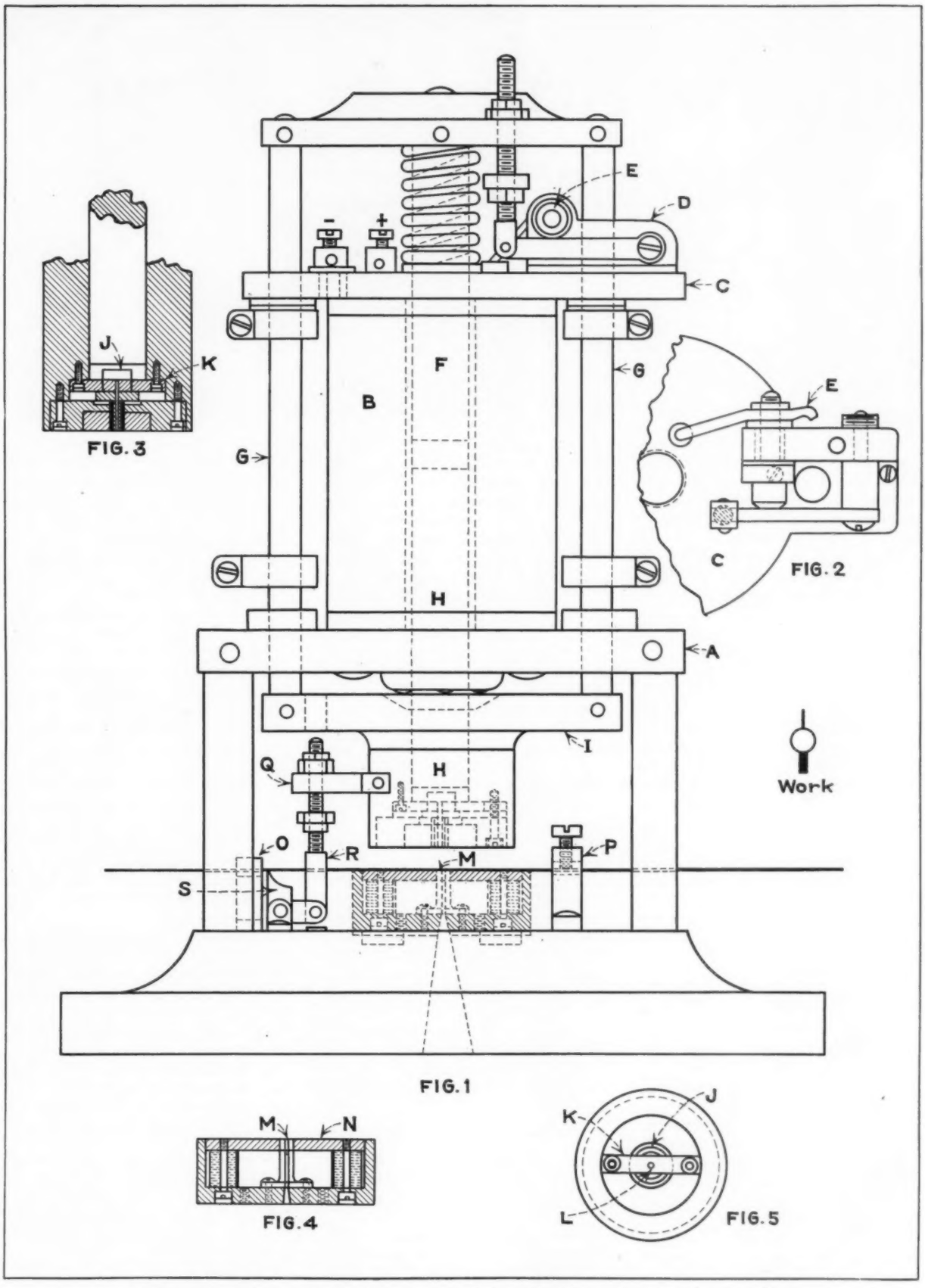
The sectional die is pressed into a shoe secured by screws to the bottom of the nose. It is of the ordinary combination kind. Instead of the usual pins to throw down the shedder *J*, two ears straddle the piercing punch holder *K*. The punch *L* is firmly secured in the punch holder. However, the punch holder is free to slide in the shedder, by which it is supported exactly central with the hole in the blanking punch *M*, Fig. 4.

The blanking punch is anchored as usual. Stripper *N* is forced upward by four soft rubber bushings, instead of by conventional springs. Thus, the bane of the diemaker's life—steel springs—is entirely absent, excepting for the coil spring that kicks plunger *F* upward.

Strip stock is kept in alignment by stock guides *O* and *P* until it appears as scrap. Feed takes place just before plunger *F* reaches the upper limit of its stroke. Arm *Q*, attached to the die nose, rides between adjustment nuts on the feed lever *R*. When arm *Q* hits the lower adjustment nuts, it rocks the feed pawl *S* backward, or clockwise. Then the angular point of the feed pawl slips out of the blanked hole in the scrap, and also lifts the scrap upward slightly. When the next hole behind is engaged by the feed pawl, the stock drops back. At this moment the die strikes the strip. The stock remains stationary until the upper nut on *R* is again contacted by the arm *Q*.

The blanks are not put back into the stock, but remain with it until plunger *F* is nearly up. Then the ears on the shedder strike the end of the stationary core and discharge the blank. An air blast catches the blank and carries it to a receptacle at the rear of the press.

From long experience with this type of press, it has been found best to have a single job permanently set up. It is less costly to make replacements than to build interchangeable components.



An automatic switch connected into one coil of the solenoid energizes it and causes downward movement of the die. The plunger is returned to the starting position by a coil spring

By Air Across the Atlantic

Airplane travel to Europe, already attractive on paper, is stimulated by the Maritime Commission's report

BLAINE STUBBLEFIELD
McGraw-Hill Washington Bureau

REPLACE superliner service with seagoing aircraft which can carry passengers, mail and express at six times the speed, at equal or lower rates. That is the rather startling recommendation made to Congress by no less authority than the United States Maritime Commission, headed by Joseph P. Kennedy, advised by Grover Loaning, pioneer airplane builder. In foreign countries such a shift would mean change, perhaps loss, to their machine tool industries and machinists. But since the United States has not and probably will not build any superliners the shift to oversea airliners could bring only increased demand for production machinery and labor.

Behind the Maritime Commission's general merchant marine recommendations, which includes the aviation proposal, is a long decline of American merchant seamanship which began with the Civil War, broken only by several abortive attempts at recuperation. The most notable of these attempts was made by the government in 1917, when several thousand ships were built. Most of them were emergency tubs; all were obsolete when the war was over. Since then staggering sums of subsidy money have been poured into these inefficient hulks which hadn't the competitive capacity to earn it back. In 1934 a congressional committee headed by Senator Black investigated both ocean air mail and domestic air mail. With justice to some and persecution to others, the domestic mail contracts were canceled, and the Post Office ocean mail contracts were outlawed by the passage of the merchant marine subsidy act of June, 1936. This act provided for heavy government subsidy of ship construction and operation to meet the foreign differential, and it set up the Maritime Commission as administrative body. The act also provided that the Commission study the possibility of applying the subsidy and other maritime laws to oversea air transport.

As the act calls for a study of "aircraft", Mr. Loening has reported on both airplanes and dirigibles. He was somewhat at a loss for lighter-than-air information, since this country has practically no commercial dirigible experience, and the Navy, with a poor operation record, is without a policy at this time. Lower cost per passenger- and ton-mile, and greater speed are attributed to the airplane. But dirigibles are conceded greater comfort, far longer fuel range, and the safety factor inherent in their ability to stop in the air. It seems probable that if the Maritime Commission gets a law to promote and control oversea flying, it will give buoyant and airfoil craft equal opportunity to prove themselves. Routes to the Orient, Australia, South Africa are too long for present airplanes, but dirigibles might show to better advantage.

The Commission finds that a fleet of eighteen flying boats, such as already designed by Boeing, Martin, Consolidated, carrying 40 to 50 passengers each on a 20-hour schedule three times a day between New York and Europe, could transport as many passengers in a year as could a superliner like the Queen Mary. The liner is figured at a cost of $50,000,000 and the eighteen airplanes at a million each.

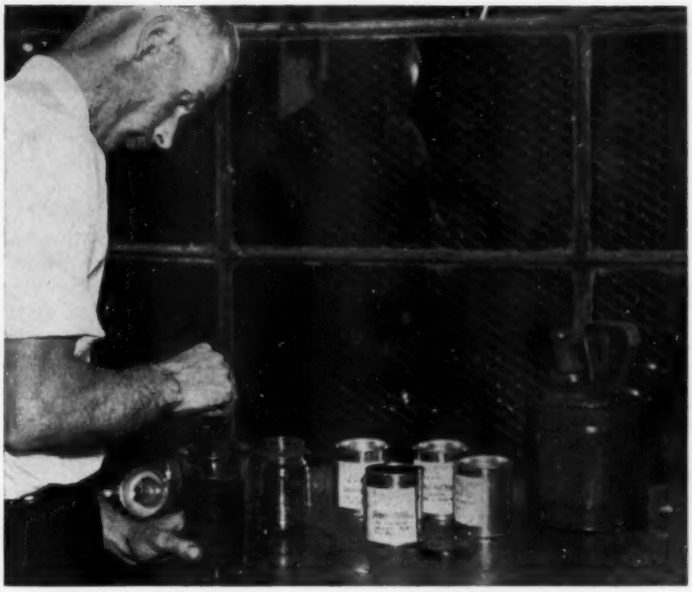
Comparing costs and performance of a fleet of six 40-passenger flying boats, a fleet of two 100-passenger dirigibles, and one 2000-passenger liner, all operating transatlantic on 100 per cent schedule and at load capacity, the Commission finds the interesting items shown below. The first three are per passenger crossing.

On near-future airplane and dirigible designs submitted by competent authorities, Mr. Loening quotes radically lower costs and much better performance.

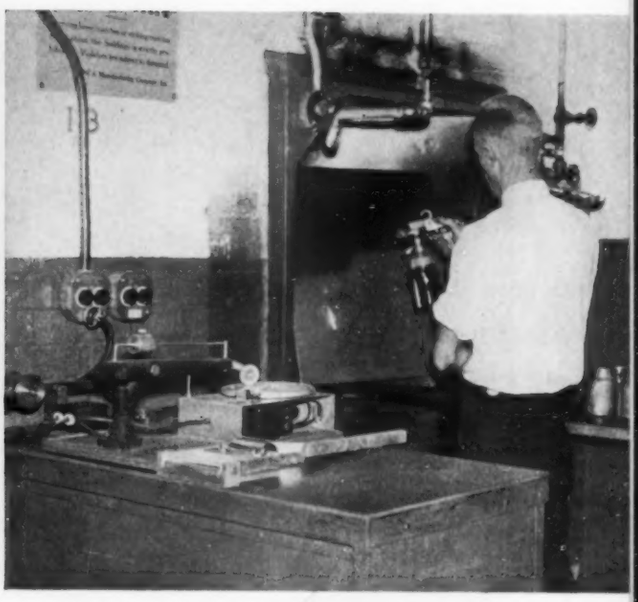
Neither the Maritime Commission, nor any one else, has estimated the probable demand for oversea flying equipment in the near or far future. It seems probable that most of the main passenger trade routes will be covered by airplanes operated by air transport companies or as auxiliaries by shipping concerns. A half dozen or more American and foreign shipping companies already own or partially control parallel or auxiliary air services. Probably all oversea first class mail will be flown. At present the volume of mail between the United States and Europe is 6000 to 8000 lbs. a day. At $2 a pound, the maximum under present law, that is just chicken feed. One flight per day could carry it.

Airplane construction is now largely handcraft and as such it produces more opportunity for skilled workmen than for machine builders. It does, of course, use many machines. When standardization comes it will greatly increase the proportion of machine work. When that will be is not predictable.

	Airplanes	*Dirigibles*	*Liner*
Depreciation, fuel, and crew cost	$73.10	$131.83	$67.58
Horsepower hours	1679	1692	8800
Crew hours	9.6	25	73.7
Equipment cost	$6,000,000	$7,200,000	$50,000,000
Equipment cost per passenger	$25,000	$36,000	$25,000
Crossings per year	730	128	48
Running time	17-23 hours	2-2½ days	4-5 days
Annual passenger capacity	29,200	12,800	96,000



"Wet" samples are diluted with thinner and sprayed according to instructions of the standards department. The test is impartial because the vendor's name is withheld



Three 2x2 ft. panels are sprayed with production-type equipment to determine the covering power of the sample material

RCA Finish Testing and Standardization

Largest savings in the cost and inventory of finishes result from the efforts of a standards department

A. L. PIPPER
Manager, Engineering Standardization Department
Camden Plant, RCA Manufacturing Company, Inc.

ALL FINISHES used in the RCA plant at Camden must be tested before approval for production use. Moreover the whole matter must clear through the standards department to assure against duplication of effort, duplication of finish specification inadvertently, and incorrect purchase or use specifications. By this system no one can be stampeded into buying a finish because of glowing reports, or because he thinks it would go over big with the buying public.

The standards department is vitally interested in new finishes and will always accept them for an impartial test that reveals the relative merits of the products of different suppliers. "Wet" samples, that is cans of the finish, are identified only by a number. They are then sent to the Model Shop for testing on the equipment devised and installed there. Here three 2x2 ft. panels are sprayed with the wet sample, diluted with the recommended thinner. Thus, 12 sq.ft. are sprayed, and the amount of material required is carefully measured. Production-type spray guns are used.

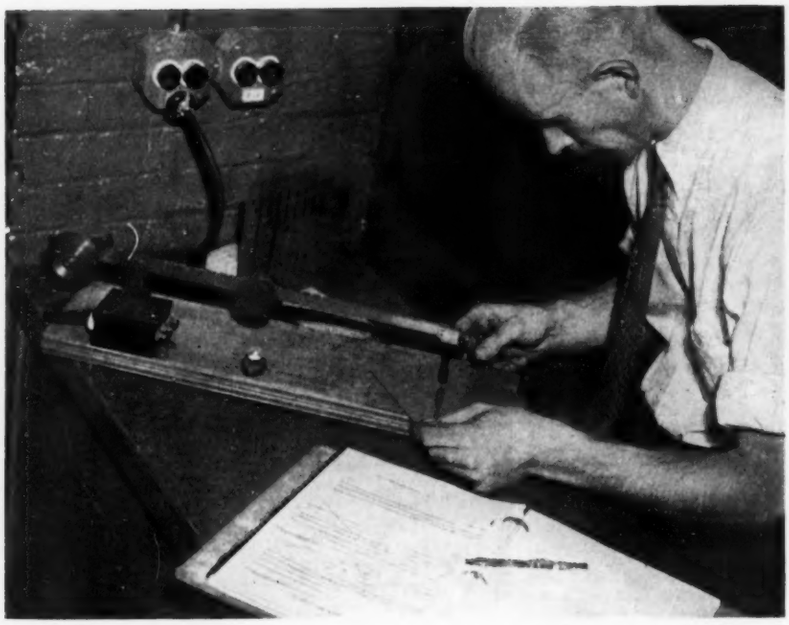
Test Record on Sample

Three other tests are also made. These involve a scratch test, an abrasion test, and a bend test. All three tests are made on a 3x5 in. chip $\frac{1}{32}$ in. thick, punched and notched as shown. Thus, a complete record is placed on one sample.

The scratch test is made by putting the chip under a standard scale beam pivoted at one end and having a phonograph needle at the free end. The chip is drawn out from under the needle repeatedly, the load on the scale beam being increased each time, until the needle penetrates the finish to the metal.

For the abrasion test, the chip is laid on a phonograph turntable, and a standard round ink eraser substituted for the needle in the arm is brought to bear on the sample. The turntable revolutions are recorded by a standard counter until the eraser breaks through the finish. To achieve correct abrading action of the eraser it is skewed; that is, not at right angles to a turntable radius.

Breakdown of the finish by bend-



A scratch test is made by weighing the scale arm and withdrawing the sprayed chip from under the phonograph needle

ing a sample 90 degrees on curves of different radii is tested comparatively on the third device. This consists of a base plate with a number of radii at one end and a handle carrying a roller by which all the notched parts on the panel are rolled over the radii at once. True rolling action, not abrasion, is maintained in this fixture. The plate is laid over the locating pins and the five tabs are rolled over the $\frac{1}{32}$, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$ and $\frac{3}{16}$ in. radii. Many samples of finishes fail on the $\frac{1}{32}$ in. radius, but their comparative merits are indicated by the sharpest radii over which they will bend without breaking the finish.

The standard test chip with the data recorded, together with a number of standard 3x5-in. panels is sent to the standards department. From these data, the standards department makes up a standards sheet that lists the standard finish number, the type of finish, the application of the finish, the drawbacks to its use on certain kinds of work, the safety precautions to be observed, and the general instructions to the shop regarding thinner, consistency and method of use. Copies of this standard sheet go to the purchasing department, to the stockroom, to the factory, and to accounting.

To Lowest Bidder

The purchasing department buys from the vendors listed according to price quotations at the time. There no longer is any preference for the product of company *A* as against that of company *B*. Individual preferences are eliminated and no longer can anyone send through an order at rush order prices, while a similar product from another company is reposing in the stockroom shelves.

Abrasion-resisting properties of the material are determined by the number of revolutions the turntable makes before the eraser breaks through the finish

18,292 REQUEST FOR SAMPLE AND TEST OF METAL FINISHING MATERIAL

RCA FINISH #

TO STANDARDIZING DEPARTMENT:

Please request one (1) pint quart gallon sample of metal finishing material with the following characteristic:

1. Material _____
   May be Obtained From _____
   Color _____
3. Finish
   High Gloss___ Gloss___ Semi-Gloss___
   Flat ___ Wrinkle _____
   Any Other _____
4. Surface to be Applied Upon
   Sheet Metal (state kind) _____
   Plating (State kind) _____
   Casting (State kind) _____
   State any other surface _____
5. Application Method
   Brush _____ Dip _____
   Spray at _____ lbs. pressure with
   Gun (make) _____
   Tank? Yes _____ No _____
6. Used as Under Coat _____
   Finish Coat _____
7. Apply ___ coats of this material over ___ coats of _____
8. Drying Schedule _____
   Air Dry Within _____
   Box Oven _____ ° F.
   Time _____
   Automatic Oven _____ ° F.
   Time _____
   Heat with Electric Gas Oil Steam
   Direct _____ Indirect _____
9. Subsequent Handling
   Exposure outside _____ Inside _____
10. Any Other Information _____

SPECIAL REQUIREMENTS

REASON FOR REQUEST

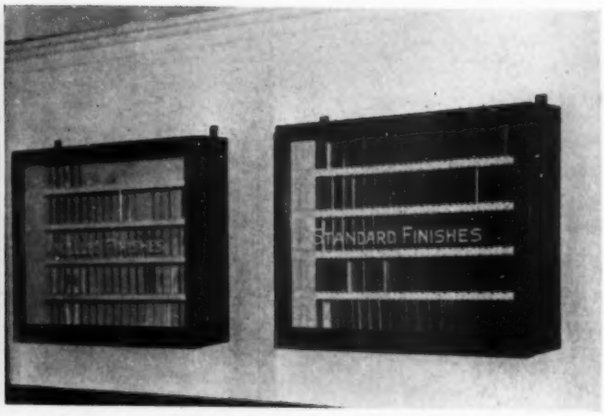
Signed: Dept. Date

FINAL DISPOSITION

Standardizing Department.

NOTE: Send three (3) copies to Standardizing Dept., retain one (1) copy for your file.

Five tabs on the chip are rolled simultaneously over various radii to find the minimum radius over which the sprayed film can be bent without rupture



Display boards of standard finishes are on view in several departments as well as in branch plants so that everyone concerned will talk in the same terms

Finishes are now known only by the number, not by trade names.

Display boards showing standard finishes are kept in the standards room, the sales department, the styling department, the drafting room, incoming materials inspection department and the shop, and also in branch plants. Thus everyone concerned with the specification or use of finishes knows what a certain finish may be expected to look like and its color. Thus everyone talks in the same terms.

The vendor's products get a test that is absolutely impartial. No unsuccessful vendor is given a sample of the successful company's product, but he is told in what respects his product did not measure up. Then he is free to go ahead with improvements. Impartial treatment of suppliers has brought forth a fine degree of cooperation.

Three forms record the work of testing and standardizing a finish. Manufacturers' products are known solely by numbers until listed on the "Standarizing Notice" as approved materials

18,291 METAL FINISHING MATERIAL TEST REPORT

CODE # _____ RCA FINISH # _____

PRODUCT _____

Approved Rating _____ Rejected (see note) _____ Am't. Tested _____ Ft. ___ Qt. ___ Gal.

Coverage per gallon (3' x 3', 9 sq.ft.) Present Mat. _____ Mat. Tested _____

Method of Application _____ Applied Over _____

Std. Am't. of Coats to Cover _____ Req'd. No. of Coats to Cover _____

Reduced _____ % with _____ Flow _____

Adhesion _____ Blush Resistance _____ Flexibility _____

Print Resistance _____ Scratch Hardness _____ Hiding _____

Match for Sheen _____ Color _____ Spray Time Sq.Ft. _____ Sec.

Air Dry: Dust Free _____ Tack Free _____ Hard _____

Baking _____ Hrs. _____ °F. Electric Gas Oil Steam Direct Indirect Automatic

Spray Gun _____ Type Nozzle _____ Needle Setting _____ Air Pressure _____ #

Viscosity _____ Humidity _____ Temperature _____ °F.

COMMENTS:

SAMPLE RECEIVED _____ Date Tested _____ By _____

PURCHASING DEPT.

Standardizing Dept. Date

RCA Victor Division
STANDARDIZING COMMITTEE

DATE NOV.11,1936 PAGE 1

SUBJECT CLEAR LACQUER - DULL FINISH #477

STANDARDIZING NOTICE 98-2-477

*Indicates a Change **Indicates an Addition ***Indicates an Elimination

DESCRIPTION - (Read "HAZARDS" Below)

A one coat quality dull clear lacquer used as a protective coating on plated parts to prevent finger printing corrosion, etc., and to give the effect of Steelblasting.

PROCESS:

1 - Clean with solvent when necessary

2 - Spray one (1) coat of clear lacquer thinned one (1) part of lacquer to one (1) part of thinner at room temperature. (See Notice 98-3-3000).

NOTE:

Approximate coverage per gallon:-

Dull Clear Lacquer 326 square feet.

Coverage data is based on the number of square feet covered per gallon of material using a 3 Ft. x 3 Ft. panel (9 Sq. Ft.) as a unit of measure.

High humidity will cause a blush or bloom. This can be eliminated by adding retarder up to approximately sixteen (16) ounces per gallon of lacquer. The addition of retarder will lengthen the final drying time.

APPROVED MATERIAL

RCA-477 Clear Lacquer - Dull — Reduced With RCA #1 Solvent Cleaner / RCA #1 Thinner

HAZARDS:

Lacquer - Thinner - Solvent

These materials are highly inflammable, volatile and give off explosive gases.

Do Not Use Near Open Flame. Use In Safety Cans Only except where lacquers are furnished by vendors in metal containers up to five (5) gallons capacity.

Be certain of sufficient ventilation. Rags, waste, etc., used should be kept in a METAL container provided for same. This must be removed from the premises at the close of each day.

S/A

SEE SAFETY INSTRUCTIONS #1.

Vocations for Many

With double its accustomed funds to handle, the Education Office faces the serious task of guiding the Congressional appropriation into constructive channels

PAUL WOOTON
Washington Editor

A WIDE RANGE of skilled trades, more persons in and aspiring to those trades, and the industries that employ them, will benefit under the new program of the Education Office, which has twice as much federal money as ever before. Six million dollars voted by the last Congress have just been allotted to the states after long delay, to augment their own vocational programs during the six month period ending December 31, 1937.

Employers are already showing renewed interest in cooperating with local vocational and high schools in an effort to fit more people for jobs and to improve the ability and the earnings of more employed persons. Further alleviation of skilled labor shortage is expected as one result. One example of work already in progress is in Baltimore, whose schools are now training 250 of the personnel of The Glenn Martin Company, and training 150 more to enter the company's service when they finish their courses.

When he signed the Department of Interior appropriation bill last August, President Roosevelt protested the vocational education allotment, which he said was $10,000,000 more than the Budget Bureau's estimate he had sent to Congress. He expressed doubt that the additional funds could be used economically. The President then called for a committee to study vocational training experience, facilities, and teaching personnel of the states. This was done, and allotments to the states have just been made. Education authorities say appropriations were not increased four or five times over, as a first glance indicates. The Office has had $7,000,000 a year since 1917 under the Smith-Hughes Act. Then it had in addition $3,000,000 a year under the George-Ellzey Act which expired this year. Then Congress appropriated $14,500,000 under the George-Deen Act of June 8, 1936. The total this year is thus about $21,000,000, or only twice what it has been in the past.

About $34,000,000 has been spent annually for a period of years on vocational education. An average of $10,000,000 came from the federal government, and $24,000,000 from the states and local governments. Thus local government spent about 2½ times as much as the federal government. Over 1,400,000 persons are now being trained in vocational schools of various kinds. About 600,000 of these are in skilled occupations of trade and industry. About 500 occupations are assisted under the federal policy.

In addition to training more people in skilled occupations, the new Education Office program will expand in the semi-skilled trades. The Office believes that large numbers of persons of limited mentality can be taught to perform a wide variety of simple but necessary jobs entirely adequately. Most such persons become satisfactory employees. If left to themselves they are unable to survive in the standard schools and many of them become public liabilities, socially and economically.

From the industry's point of view, the Education Office, in cooperation with the Labor Department's Committee on apprentice standards, aims toward control of the supply of skilled labor for the advantage of workers and employers. If a shortage occurs, industry falls behind in production; an over-supply brings loss to the workers and relief tax burdens to employers. For some time now an erratic shortage has existed, appearing in one place, then another, in varying degrees. Statistics on the shortage cannot be compiled. But almost complete, immediate absorbtion of vocational school graduates shows plainly that more skilled personnel are needed. One New York school placed 100 per cent of its output. A great majority of students got jobs even in depression times.

In aiding employed persons to increase their earnings by improving their skill, the vocational schools point out that the specialized nature of machine and factory work often prevents workers from learning any more than their regular routine, unless they are helped by either employer or some outside agency. The schools cite, as one example, their training in the new plumbers' welding technique, which enabled many youngsters to step into jobs and many older men to keep theirs. Trade extension is what they call this kind of work, helping men to keep abreast of their jobs. It is a definite part of the vocational program.

Distributive and service occupations will receive more attention from the federal vocational administration under the new program. It is believed that millions of workers in retail and service establishments, who come in contact with the public, could be of much greater value to their employers, given proper training. Most of that class of workers have not had the social experience which would enable them to meet and deal with people.

Unquestionably the trend in lower schools is away from over emphasis on the academic, toward the practical crafts. This move has gone so far in one large city system that educators are afraid it will swing too far away from the cultural. The ideal balance would be arts and sciences for all those capable of absorbing and using them. Others should have rudimentary education and some sort of saleable craft.

ROUND TABLE

Weak Kneed?

"There's one too many words in our language, Al. At least it's being overworked. For our own good, we should scrap the word 'cooperation' for a while. There are a lot of us who need to learn how to stand on our own feet."

"What's eating you now, Ed? Sounds to me as if you've just had a large dose of something that didn't agree with you."

"I'm fed up with all the red-tape we have to untangle before we can get something done. Al, it's getting so we have to call a meeting every time the storeroom runs out of set-screws or the engineer wants to change the shape of a casting."

"Cool down a bit, Ed. Better count to ten and then tell me all about it."

"Well, Al, it's this way. I've told you about those two orders for special gears we've been trying to rush through the shop. I've practically lived with them since the first forging came into the department. Everything was under control until Ray Evans smashed his hob this morning."

"Thought you told me that you had bought a spare hob when the orders were placed? You can still produce gears, can't you?"

"Sure, we're still making gears, but what happens when that second hob has to be ground—or gets broken? I requisitioned another hob at once, but William's assistant held up his approval until we'd spent a couple of hours investigating the breakage of that darned hob. It seems that the rule book says he has to report fully on all requisitions for more than twenty-five dollars."

"Oh, well, what's a couple of hours in your young life, Ed? At least you won't need that new hob today. Why not forget it until morning?"

"I've quit worrying about it, Al. The new one will be here soon enough, now. What burns me up is the inability of so many of our men to make up their minds. They have to run around and find out what somebody else thinks about their problem. Cooperation is what they call it. I think it's a sign of weakness."

"Well, you can't expect everyone to know all the answers. The only

way we can hope to get things done is for every man in the shop to pitch in and help."

"No, we don't know the answer to everything, Al. But we'd all be a lot better off if we put more time into actual thought and less into leaning on the other fellow. The 'rugged individualist' isn't in very good repute these days, but that kind of man can accomplish more in a day than a dozen cooperators can get done in a month."

"A shop full of high-pressure individualists would soon seem like a wildcat's den. Seems to me that a little more cooperation between you and Evans might have saved that hob."

"You mean that the use of a bit of horse sense on his part would have kept us from buying a new one. If he'd stopped to think, he wouldn't have tried such a heavy cut. No sir! Cooperation to the extent of being on speaking terms with other people is all right—but nothing can take the place of a share of 'guts' when there's a job to be done."

Is cooperation overdone? Have we come to count too much on help from our associates?

DISCUSSION

Tell It All

Confidence of workmen in management is a major factor toward the cooperation and satisfaction of both. A sincere booklet describing policies and intentions of the company, showing that the management is working for the benefit of all, will do much to maintain the confidence of the men and spoil the propaganda frequently heard on the street. Every order does not need an explanation, but the men will cheerfully abide by the orders if they know that the general purpose and intentions of their employer is good.

Managements of today need not and do not hide their plans, but they seldom take the trouble to explain conditions to their men. Whenever trouble starts, whenever conditions get unpleasant or work slackens temporarily, management will be blamed by a few men immediately. Others pick up the distrust soon enough by listening to the one-sided explanations offered by the few.

Times have changed and present day workers dislike to be just "bossed". The expense of a booklet that will carefully explain management policies will be little compared to the good will that it can create. The wives of the workmen, too, will be proud that their husbands are part

of a large organization. They will feel that their work is more than just a job that may be gone tomorrow. —ALFRED O. BLUMENTHAL

I believe that Al is on the right track and will greatly benefit by giving each of his employees a booklet explaining the plans and policies of his company. There is always considerable unrest in a shop when rumors get started about some change or other being contemplated. When the men have something on their minds, wondering about what is coming next, their work is certain to be neglected and quality will suffer. When he has the confidence of his employer, each shop man can be counted on to put his shoulder to the wheel and give all he has to make the business a success.

Very few companies have ever passed out information regarding their plans and policies in printed form. Such information as they desire to give out has usually been passed on to the foremen at their weekly conferences. Often, however, a handbook of shop rules has been given out. These rules usually deal with safety regulations and working conditions and are often nothing more than extracts from state labor laws and similar regulations.

Cooperative companies whose workers are usually shareholders, keep their men fully acquainted with all phases and activities of the business. These employees are usually keenly interested in the success of the company and they take much interest in any information published for their benefit.

—WILLIAM W. BARNETSON

Where There's Smoke

The percentage of men who sneak away for a smoke during working hours is usually small. If the penalties for this offense are drastic, this percentage can be reduced to a very small minimum.

Installing smoking compartments because of this small group of men would only give all of the men a legitimate excuse to get away from their work whenever they feel like it. It may, also, have the undesirable effect of instilling a desire to smoke in the minds of many of the men who ordinarily would never think of it during working hours.

The man who does not have enough regard for shop rules to refrain from smoking on the premises will not be very much concerned by knowing that he can be seen by both his fellow workers and his foreman when he is permitted to go to a glass enclosed room for a smoke whenever he feels like it. In fact, he will deem it his legal right to do so.

—ROBERT KNOTEK
Foreman, Die Department
Fisher Body Corporation

Because of the possibility of spoiling work and the danger of injury to the individual, it is not advisable to smoke at machines while working. However, if a smoking room is provided, which is safe and in plain view of the foreman and workmen, the men given this privilege will be more satisfied with conditions and more willing to work hard than if they felt they were held down. The men, as a rule, will not take advantage of such a privilege, especially since they will be in view of the foremen. They will feel that the company is doing them a favor and will not abuse it for fear of being classed as loafers. Most workmen want to play fair and will respect the rules under which smoking privileges are allowed.

Where the men do not have this privilege, and want to smoke, they will sneak out when they will be least apt to be seen by others. They will usually hunt a secluded corner or a storage place that is seldom visited by the foreman. These places are usually hazardous, since there are often rags and papers lying around. The loss of time would also be greater, as the man must go to his hiding place, which is usually some distance off, then be sure no one is around before "lighting up."

—PHILIP D. JAMIESON

Men want to smoke and do so in most shops, regardless of posted warnings or shop rules. They sneak smokes regularly and it seems a hopeless task to stop it. Wherever state fire laws permit, the logical solution is to allow smoking during working hours, or during certain periods of the day. Less time is lost on the job and the workmen will be better satisfied. No doubt the insurance companies also would benefit, as smoking in out of the way places is often hazardous.

The installation of smoking rooms, even those of the glass-enclosed type, would not be satisfactory since some employees would abuse the privilege. These rooms would not satisfy pipe or cigar smokers, since the time for smoking would have to be limited. Cigarette smokers would be only partially satisfied, since they would not be in a frame of mind to relax and enjoy their smoke while they are in a glass cage. More time will be lost if the men are permitted to take time off to smoke than if they are allowed to smoke on the job.

Where fire insurance laws prohibit smoking in the plant, the best solution is to enforce the rule strictly. This may be done by prohibiting smoking anywhere on the property, outside as well as inside, and by letting the rule apply to the foremen and superintendents as well as the workmen.

—NILS H. LOU
Toolroom Foreman
Glenn L. Martin Company

Off to a Good Start

New developments in manufacturing technique have created a demand for men who are specialists and whose expert knowledge of their work qualifies them to get results that the average foreman could not be expected to obtain. Most foremen, if they are to run their department efficiently, have little time to devote to solving technical difficulties that arise when developing new processes or organizing a new section.

This work can be best undertaken by specialists who are able to give their whole time to the work, without having to deal with the many routine duties to which the foreman must attend from day to day. New processes often take a considerable length of time to develop defore reaching the stage where they can safely be handed over to the control of section foremen.

This does not, however, make it necessary or advisable to hand over supervisory control of the section to the specialist, who should in all cases work in cooperation with the foreman rather than supersede him. Foremen are responsible for maintaining discipline and any attempt at divided control cannot fail to entail a loss of prestige with his men.

The foreman who realizes his limitations will be glad to avail himself of all the assistance and advice the specialist can offer. Efforts to ensure the active cooperation of the foreman should be the aim of management, rather than divided control with the possibility of discord. The foreman probably will be able to secure better cooperation from the workmen than the specialist could hope to have. The men are familiar with their foreman and he can supervise them to better advantage.

—W. L. WATERHOUSE
Horfield, Bristol, England

IDEAS FROM PRACTICAL MEN

Checking Concentricity of a Small Hole

FRANK HARTLEY

A rather unusual type of gaging device for checking the concentricity of one small hole in relation to another having the same axis is shown in the illustration.

In the V-block *A* on the base of the fixture is mounted the mandrel *B*, one end of which is turned down at *C* so that the work indicated by heavy dotted lines may be placed thereon. After the mandrel and the work are in the position shown, the mandrel is held by a clamp operated by the knurled-head screw *D*. As the mandrel and the work are being put in place, the outer end of the pivoted lever *F* is pressed down against pressure of the spring *H*, lifting up the hardened finger *I*, which is part of the lever, so that it will enter the hole and rest on the beveled seat *K*. The pins *L* and *M* limit the movement of the lever in either direction.

Attached to the lever is the hardened block *N* against which the end of the indicator spindle rests. Therefore, as the work is being revolved on the mandrel by the operator's finger, any movement of the lever caused by the runout of the hole is communicated to the indicator spindle and is shown by the pointer.

Turning Bar and Holder

GAYLORD G. THOMPSON

In the illustration is shown a tooling combination that has a multitude of uses. It consists of the turning bar *A;* the holder *B*, and the backup plate *C* for the toolbit. The square shank of the bar is machined for a snug sliding fit in the slot *D* in the holder. The backup plate for the toolbit can be attached to either end of the L-shaped head of the bar, but always opposite the cutting end of the toolbit. The single hole in the backup plate is for a screw for adjusting the toolbit.

The bore diameter of the holder depends somewhat on the machine in which the unit is to be used, although adapters may be made for the machine spindle to fit it.

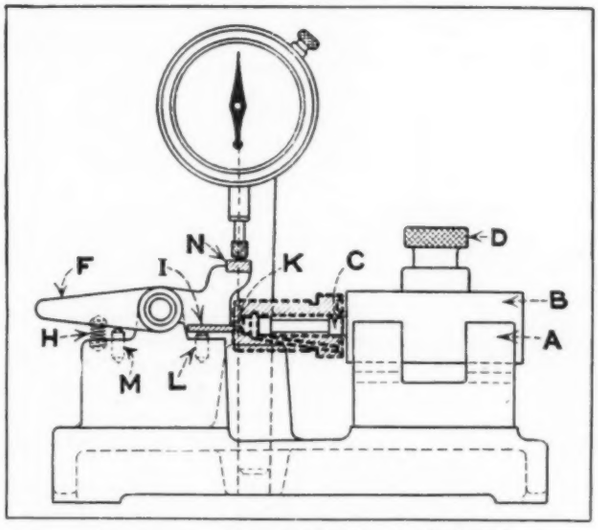
This tooling unit has given very gratifying results when used in automatic screw machines, milling machines, drill presses and lathes. In automatic screw machines the holder is clamped on the non-rotating feed spindle and can be used for turning, facing and chamfering simultaneously with other tools in that spindle. In milling machines the holder may be clamped to an adapter held in the spindle, and the unit can be used for facing and turning the outer diameters of bosses on castings of intricate shape.

In making the holder, machining time can be saved by cutting it out of steel plate with a torch.

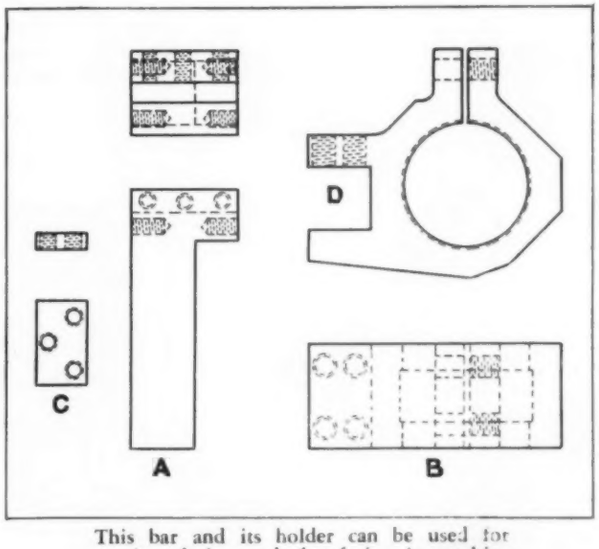
Sweep Tools in the Railroad Shop

FRANK C. HUDSON

Bearing plates on trailing truck frames have an arc or ball surface of large radius. These bearing faces are surfaced by large sweep tools ground to the proper radius, as shown in Figs. 1 and 2. Both tools are being used in the Huntington shop, Chesapeake & Ohio Railway.



Any runout of the hole being checked will be transmitted through the lever to the indicator spindle and will be shown by movement of the pointer



This bar and its holder can be used for turning, facing and chamfering in machine tools having either rotating or non-rotating spindles

They are driven by a No. 5 Morse taper shank. The shanks are pressed in the cutter body and a ½ in. key prevents turning under stress of the cut.

The cutters are offset in the body to bring the cutting edges opposite and radial. The cutters are ½ in. thick and held in place by ⅝-in. rollow-hex, cup-point, setscrews. The general dimensions of both the male and female tools are shown in Figs. 1 and 2.

Another sweep tool but for cutting oil grooves in the face of shoes and wedges is seen in Fig. 3. This shank also has a No. 5 Morse taper. The cutting edges have little work to do in comparison with those previously shown so the cutter body is small and the sweep tool extends beyond it. The spacing of the cutting edges varies from 5¼ to 6½ in., according to the width of the surface in which the oil grooves are to be cut.

Owing to the small size of the cutting surfaces and the distance between them, there is no attempt to have them in line although they could be ground radial if it were an advantage. The cutter is 39/64 in. thick and is held in place by a single ⅝-in. cone-point special setscrew in the bearing surfaces at desired intervals.

Adjustable Clamp Heels

J. R. WHITTLES

The adjustable clamp heel described by C. F. Fitz in an article under the above title (*AM*—Vol. 81, page 990) brings to mind the clamps we use when we have work of several thicknesses to be clamped. We offset the clamp to make it adjustable, as shown in the illustration.

Instead of a knurled-head screw for a heel, we use a square-head setscrew and place it with the head in the down position, changing the position of the screw when the clamp is reversed. The length of the heel screw is the same in all cases, but the length of the clamping screw will vary with much change in the thickness of the work. If the head of the heel screw should come over a hole in the machine table in setting up the job, we place a piece of flat steel under it, covering the hole.

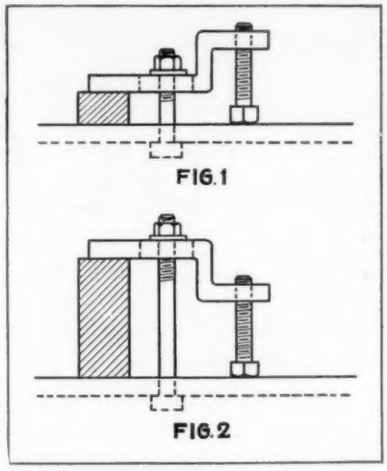
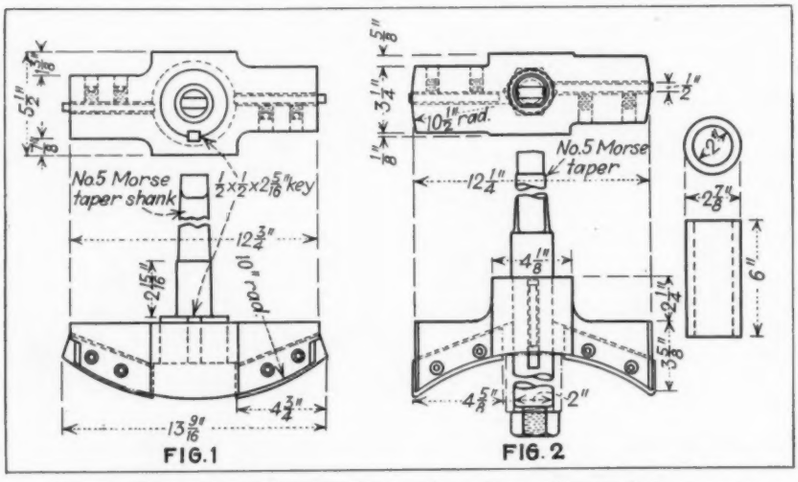
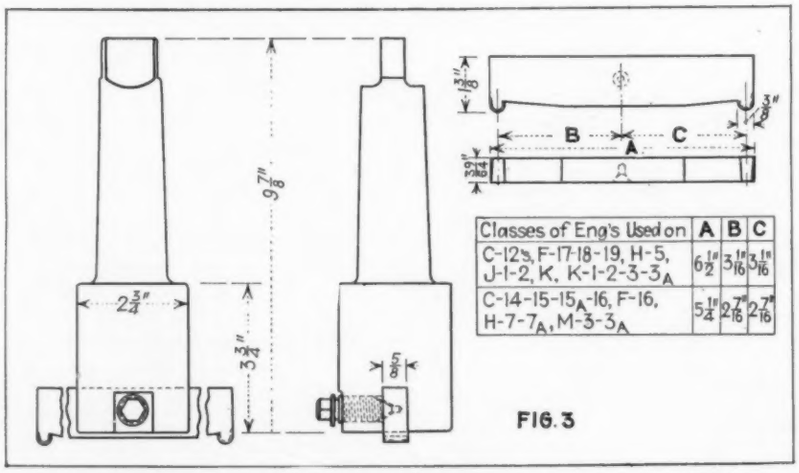


Fig. 1—Position of clamp in holding either thin work or work of medium thickness. Fig. 2—Position of clamp reversed for holding work of maximum thickness



Figs. 1 and 2—Curved bearing-plate surfaces for trailing-truck frames are surfaced with these male and female sweep tools



Classes of Eng's Used on	A	B	C
C-12's, F-17-18-19, H-5, J-1-2, K, K-1-2-3-3A	6½"	3 1/16"	3 1/16"
C-14-15-15A-16, F-16, H-7-7A, M-3-3A	5¼"	2 7/16"	2 7/16"

Fig. 3—Oil grooves in the faces of shoes and wedges are cut with this sweep tool of lighter design

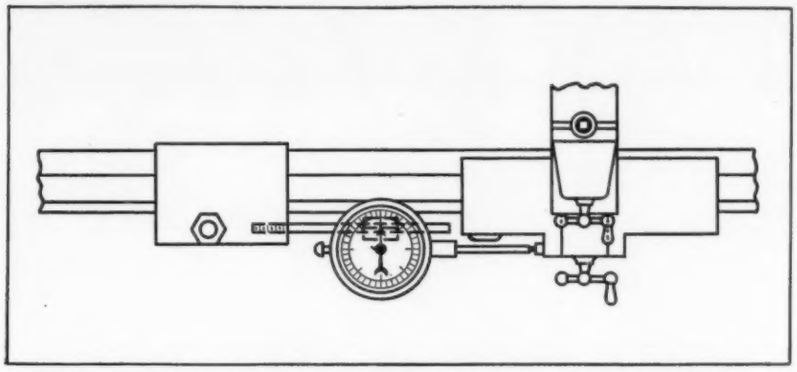
Micrometer Stop for the Lathe

F. E. CLARKE

I have read from time to time with interest the different articles on stops for the engine lathe, but the stop described by J. R. Whittles (*AM*—Vol. 81, page 373) strikes me as being rather elaborate and too costly to make.

The stop illustrated herewith is the best one I have ever seen. It is very simple to make and employs a dial indicator mounted on a pin projecting from a block clamped to the front V of the lathe bed in such a way that the end of the carriage wing will contact the indicator spindle. The indicator is so located on the pin that if the carriage should accidentally travel too far it will contact the pin and move the stop before the indicator spindle has reached its limit of travel, thus preventing possible damage to the instrument.

A stop of this type has many advantages over one of the solid type. There is no danger of running the carriage too far without knowing it, thus moving the stop and losing the setting. The operator is able to make



If the carriage travels too far it will contact the pin on which the indicator is mounted and prevent damage to the instrument.

a more accurate setting by observing the indicator pointer than by running the carriage against a positive stop, especially on a large lathe where the carriage runs a bit hard and it is difficult to tell just when it makes contact with the stop. But with the stop illustrated it is easy to see the position of the carriage in relation to the cut by watching the pointer.

The stop can be quickly reset to a new position since no time is lost in running the stop screw in or out. Used in connection with size blocks, the stop is specially useful in boring blind holes to accurate depth and in squaring the bottoms.

Fixture for Center Marking Rounds and Squares

JOHN E. HYLER
R. G. Le Tourneau, Inc.

A fixture for center punching either rounds or squares is worthwhile in many shops. To the plate *A* are welded two V-blocks *B* to support the work. At one end are two gibs *C* that guide a beveled bushing plate *D*. One of the gibs has a setscrew so that the bushing plate can be locked in position vertically. Bushing plate *F* lies on the vertical centerline of the V-blocks.

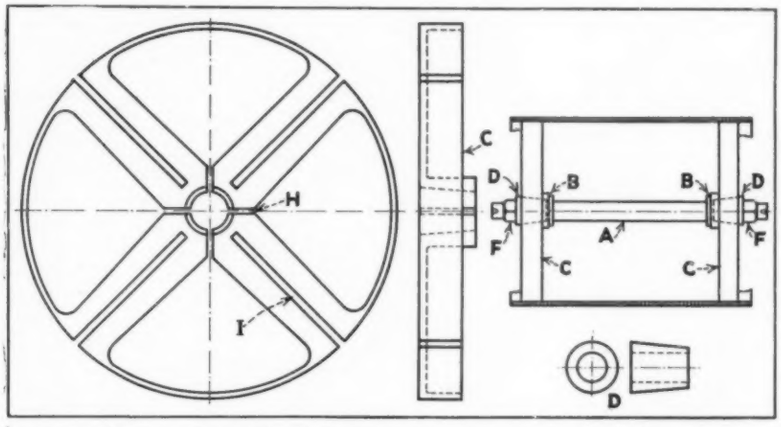
The lower edge of the bushing plate is cut off at an angle to match the wedge *G*. Plate *D* has a gage mark at *H* while wedge *G* has a number of graduations that represent various center heights of the stock to be center punched. After wedge *G* is set to bring the bushing central with round or square work, the latter is prick punched through the bushing. Heavy work will have sufficient inertia to give a good center mark with one smart blow.

Cylinder-Facing Fixture

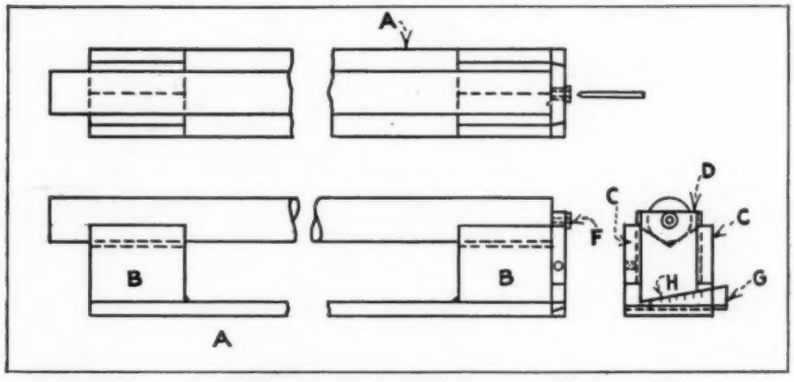
MARTIN H. BALL

The illustration shows a fixture for facing sheet-metal cylinders having welded joints and required to be accurate both in diameter and length.

Essentially, the fixture consists of the mandrel *A*, the center part of which is covered by a free-fitting sleeve (not shown) of steel tubing; the steel washers *B*; the cast-iron spiders *C*; the tapered bushings *D*; and the nuts *F*. The mandrel is threaded at both ends far enough to provide for the various adjustments required. The sleeve serves as a distance piece to separate the spiders and is accurately faced at both ends to serve as seats for the washers, which are also faced on both sides. The hubs of the spiders are taper bored for the tapered bushings and



The spiders are expanded with equal pressure at each end of the cylinder by tightening either of the nuts on the ends of the mandrel



Hand scribing of intersecting lines on round or square work can be avoided by the use of a fixture for center punching

bear against the washers. Tightening either of the nuts will expand the spiders radially and with equal pressure on each end of the cylinder.

In molding the spiders, the $\frac{1}{4}$-in. cores for the slots *H* in the hubs and the $\frac{1}{2}$-in. cores for the radial slots *I* in the spokes are so set that they cut through but one side of the castings, leaving a $\frac{1}{4}$-in. web on the opposite side to give stiffness while machining. This web is cut away or broken out after machining has been completed, allowing the spiders to expand and hold the cylinders tightly when either of the nuts are tightened.

AMERICAN MACHINIST *Reference Book Sheet*

Welding Symbols—II

Second part of practice recommended by the American Welding Society for drawings specifying fusion or resistance welding

INSTRUCTIONS FOR USE OF WELDING SYMBOLS

I. GENERAL

(a) Do not use the word "weld" as a symbol on drawings.

(b) Symbols may or may not be made freehand as desired.

(c) Inch, degree, and pound marks may or may not be used as desired.

(d) The symbol may be used without specification references or tails to designate the most commonly used specification when the following note appears on the drawing:

"Unless otherwise designated, all welds to be made in accordance with welding specification No....."

(e) When specification references are used, place in tail, thus:

(f) Symbols govern weld to a break in continuity of the structure, or to extent of hatching or dimension lines.

(g) Faces of welds assumed to have user's standard contours unless otherwise indicated.

(h) Faces of welds assumed not to be finished other than cleaned unless otherwise indicated.

(i) All except plug, spot, and projection welds assumed continuous unless otherwise indicated.

(j) All except V- and bevel-grooved welds are assumed to be closed unless otherwise indicated.

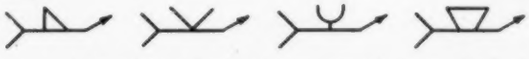
II. FUSION WELDS

1. General

(a) Do not put symbol directly on lines of drawing; place symbol on reference line and connect latter to joint with arrow, thus:

(b) For welds on near side of member, show symbol on near side of reference line, face toward reader, thus:

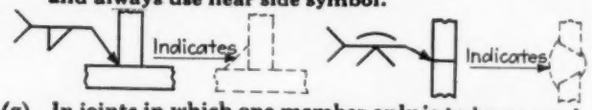
(c) For welds on far side of member, show symbol on far side of reference line, face away from reader, thus:



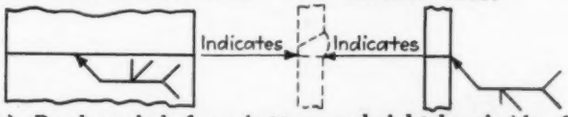
(d) For welds on both sides of member, show symbols on both sides of reference line, faces toward and away from reader, thus:

(e) In plan or elevation the near side, far side, and both sides locations refer to the nearest member parallel to the plane of the drawing, or approximately so, and not to others farther behind.

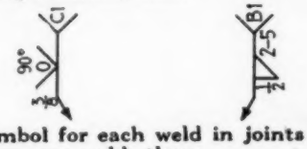
(f) In section or end views only, when the welds are not drawn, the side to which the arrow points is considered the near side of the member and the locations of the symbols on the reference line have their usual significance. In the case of joints made with one weld only, connect arrow to side to be welded and always use near side symbol.



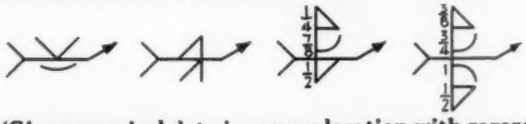
(g) In joints in which one member only is to be grooved, show arrow pointing to that member. thus:



(h) Read symbols from bottom and right-hand side of drawing in the usual manner and place numerical data on vertical reference lines so that reader will be properly oriented, thus:



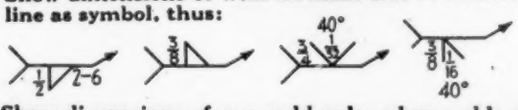
(i) Show symbol for each weld in joints composed of more than one weld, thus:



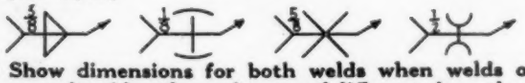
(Give numerical data in proper location with regard to each symbol.)

(j) In complicated joints requiring large compound symbols, two separate sets of symbols may be used if desired.

(k) Show dimensions of weld on same side of reference line as symbol, thus:



(l) Show dimensions of one weld only, when welds on both sides of member are of the same size, thus: (See II, 3a)

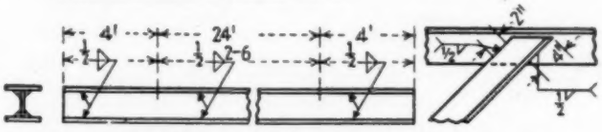


(m) Show dimensions for both welds when welds on opposite sides of member are of different sizes, thus: (See II, 3a and 3d)

AMERICAN MACHINIST *Reference Book Sheet*

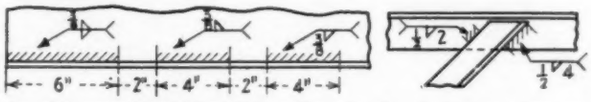
Welding Symbols—II

(n) Indicate specific lengths of welds in conjunction with dimension lines, thus:

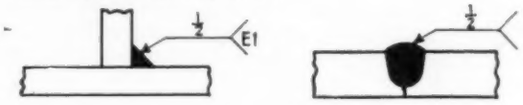


(o) Show the welding between every break in the continuity of the structure, thus:

(p) When it is desired to show extent of welds by hatching, use one type of hatching with definite end lines, thus:

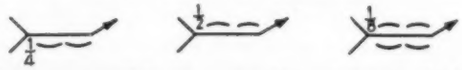


(q) If actual outlines of welds are drawn in section or end elevation, basic symbol is not necessary to show type and location; size or other numerical details only need be given, thus:

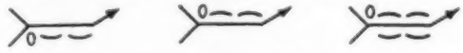


2. Bead Welds

(a) Show bead welds used in building up surfaces (size is minimum height of pad), thus:

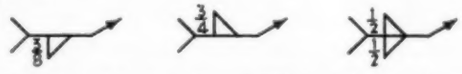


(b) When a small but no specific minimum height of pad is desired, show thus:



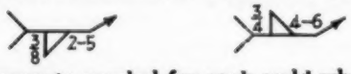
3. Fillet Welds

(a) Show the size of fillet weld (length of shorter leg), thus:



(b) Show specific length of fillet weld or increment, after size, thus:

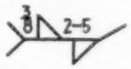
(c) Show center-to-center pitch of increments of intermittent fillet welds after increment length, thus:



(d) Use separate symbol for each weld when intermittent and continuous fillet welds are used in combination.

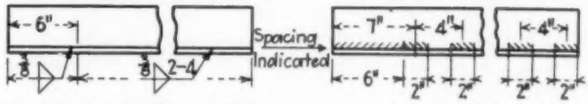
(e) Show chain intermittent fillet welds, thus:

(f) Show staggered intermittent fillet welds, thus:



(g) Pitch of staggered intermittent fillet welds measured between centers of increments on one side of member.

(h) Increments and not spaces assumed to be placed at both ends of length governed by an intermittent fillet weld symbol unless otherwise indicated, thus:



(i) Faces of fillet welds assumed to be at 45° from legs unless otherwise indicated.

(j) When face of fillet weld is at any other angle than 45°, show smaller angle, thus (size is length of shorter leg):

(k) Show position of longer leg of fillet weld by placing symbol in same relative position that obtains on work, thus:

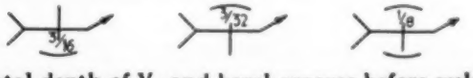
4. Grooved Welds

(a) Show side from which square-grooved weld is made by bead or flush symbol, thus (see III, c and III, e):

(b) Total penetration of square-grooved welds assumed to be complete unless otherwise indicated.

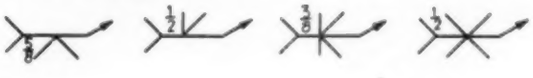
(c) Show size of square-grooved welds (depth of penetration) when penetration is less than complete, thus:

(d) Show root opening of open, square-grooved welds inside symbol, thus:



(e) Total depth of V- and bevel-grooves before welding assumed to be equal to thickness of member unless otherwise indicated.

(f) Show size of V- and bevel-grooved welds (depth of single groove before welding) when grooving is less than complete, thus:



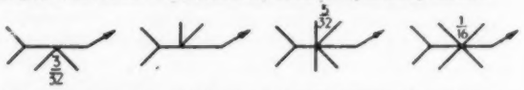
AMERICAN MACHINIST *Reference Book Sheet*

Welding Symbols—II

(g) Total depth of penetration of V- and bevel-grooved welds assumed complete, unless with usual welding processes, depth of grooving is such that complete penetration is not possible, when depth of penetration is assumed to be depth of groove plus normal penetration. When using welding processes giving abnormal penetration, give information on latter by detail or note. (See III, j).

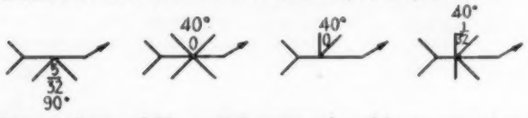
(h) Root opening of V- and bevel-grooved welds assumed to be user's standard unless otherwise indicated.

(i) Show root openings of V- and bevel-grooved welds when not user's standard, inside symbol, thus:



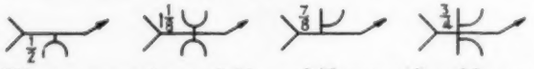
(j) Included angle of V- and bevel-grooved welds assumed to be user's standard unless otherwise indicated.

(k) Show included angle of V- and bevel-grooved welds when not user's standard inside symbol, thus:

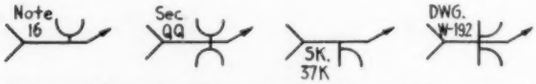


(l) Proportions of U- and J-grooved welds assumed to be user's standard unless otherwise indicated.

(m) Show size of U- and J-grooved welds (depth of single groove before welding) having user's standard proportions but incomplete penetration, thus:



(n) When proportions of U- and J-grooved welds are not user's standard, show weld by detail or reference drawing and use reference symbol thus (see III, j):



(o) Show welding done from root side of single grooved welds with bead weld symbol, thus:

5. Plug and Slot Welds

(a) Show size of plug and slot welds (root opening and root length), thus:

(Root opening equals root length for plug welds.)

(b) Included angle of bevel of plug and slot welds assumed to be user's standard unless otherwise indicated.

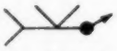
(c) Show included angle of bevel of plug and slot welds when not user's standard, thus:

(d) Show pitch of plug and slot welds in row, thus:

(e) Show fillet welded holes and slots with proper fillet weld symbols and not with plug weld symbols.

III. SUPPLEMENTARY SYMBOLS

(a) Show "field" welds (any weld not made in shop), thus:

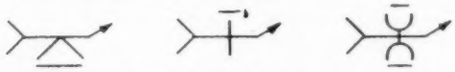


(b) Show "all around" welds (weld encircling member insofar as possible), thus:

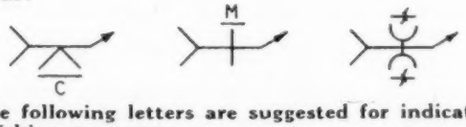
(c) The location of the flush and finish symbols have the usual near, far, and both sides significance and govern only the sides on which they are shown.

(d) Finish marks govern faces of welds only and not base metal either before or after welding.

(e) Show fusion welds made flush without recourse to any kind of finishing, thus:



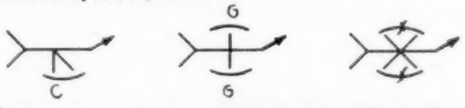
(f) Show fusion welds made flush by mechanical means with both flush and user's standard finish symbols, thus:



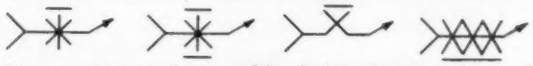
The following letters are suggested for indicating finishing processes:

C—Chip G—Grind M—Machine

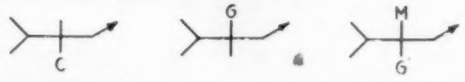
(g) Show finishing on face of fusion welds, which need not be flush, with user's standard finish symbols on bead symbol, thus:



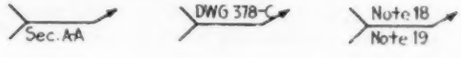
(h) Show spot, seam, or projection welds made practically flush (with minimum indentation), thus:



(i) Show resistance butt welds, finished by mechanical means, without flush symbol, thus:



(j) Show special welds not covered by any of the above symbols by a detailed section or reference drawing, or give any supplementary information by means of a note and refer weld to section, drawing, or note by a reference symbol. Reference symbol has usual location significance, thus:



INDUSTRIAL REVIEW

REPORTS FROM every industrial center in the country indicate that orders for machinery and machine tools for the month of December are likely to show a considerable decline from the November level which was not as low as had been expected. While most of the distributors of production equipment are not very optimistic about the immediate future there are occasional reports of reinstated orders and a growing feeling that possibly the bottom has been reached.

NEW ENGLAND is still waiting for some indication that Washington will adopt a more friendly attitude toward business. New York reports scattered orders with very few inquiries. Philadelphia has booked orders for single items but is disturbed by stories of lay-offs and shortening of hours. In quiries have improved somewhat in the Pittsburgh area but orders are not any too good.

FROM CLEVELAND comes word that things seem to be getting worse rather than better. Orders in Detroit are scarcer than hen's teeth and what inquiries there are will probably not become active until after January 1. Definite improvement late in January and through February is being predicted. Toledo reports little change in the gloom of the past few weeks but says that several companies in that area seem little affected. Several good inquiries encouraged Cincinnati distributors, but the general impression is that the next three months are going to be rather quiet.

NO PARTICULAR change in conditions has occurred in St. Louis. This December promises to be a very sad contrast to December of last year. In Chicago inquiries have dropped abruptly although there are lists ready to be released as soon as directors say the word. Lay-offs have been made necessary in the Milwaukee area by the decline in orders. December is apparently going to be considerably below November.

A YEAR-END dearth of orders has hit the machine tool business in the far west. Many inquiries are on file but actual buying is held up pending a clearer picture of what the early part of 1938 will portend industrially. A paralyzing strike has virtually closed down the lumber industry in the Pacific Northwest. Oil-well supply shops in Southern California are busy and there has been quite a bit of ordering for mines, particularly in southern Nevada where electric power has been made available from Boulder Dam. Most dealers are counting on next year to at last equal 1937. No one is optimistic enough to predict an increase comparable to that enjoyed in 1937, when sales in many lines exceeded those of 1936 by margins as high as thirty-five per cent.

CHIPS

Washington

Utility chiefs visit the President but get no definite promises in return for their concessions . . . Congress objects vigorously to Roosevelt demand for reduction in Federal highway aid . . . Presidential message urging steps to release $12,000,000,000 of private funds for housing marks drastic departure from New Deal philosophy . . . House committee simplifies estate and gift tax schedule, moves to plug loopholes . . . Administration pressure produces enough petition signers to get wage-hour bill out of rules committee . . . Kennedy urges amendment of unworkable ship subsidy bill including application of railway labor dispute law principle to seamen and longshoremen . . . Senatorial coalition of regular Democrats and Republicans formed to hasten recovery . . . Senate committee would put postmasters back under spoils system . . . President hurries back from vacation to try to speed up Congress . . . Supreme Court says States can tax contractors on federal work within their borders . . . Board of Tax Appeals clears late Andrew W. Mellon of tax fraud, reduces government claim to around $500,000 . . . Mr. Roosevelt says recession is merely an assumption but the hundreds of thousands of workers laid off find it hard to consider it anything but a bitter reality.

Foreign

French delegation goes home from London reassured of Britain's support . . . Russia exchanges 44 Nazi prisoners for Russians held by Franco in Spain . . . Great Britain retires older army leaders, appoints new leaders on merit alone . . . Japan returns seized American launch with apologies for disrespect to flag . . . U. S. Marines talk Japanese out of their sector of International Settlement . . . Americans leave Nanking as Japanese close in and take city . . . Soviets "mobilize" voters in first general election to convince world that they are united . . . Nazi foreign minister reported to have said return of colonies will be forced if necessary . . . Ambassador Dodd resigns Berlin post, to be succeeded by Assistant Secretary of State Hugh R. Wilson . . . Great Britain planning protective camps for civilians in case of air raids.

Finance

Treasury asks for no new money, bills are for refunding, totals $450,000,000 . . . Bonds of $250,000,000 oversubscribed 15 times, notes making up balance oversubscribed 11 times.

Industry

Lewis and Green get together to draw up labor peace but fail to accomplish anything . . . C.I.O. loses first round in attempt to invade Jersey City . . . Labor Board attacks Berkshire Mills for "company union" promotion . . . Army places large orders for airplane engines and parts . . . Newspaper Guild enjoined from picketing advertisers . . . Labor Board accuses Weirton Steel of influencing newspapers, demands that business paper editor produce records to substantiate his account of trial.

Indicators

Steel production drops below 30 per cent but bottom has probably been reached . . . Electric power output up less than seasonally. . . . Business Week's index stationary.

Charles R. Hook, president of American Rolling Mill Co. (left) was chairman of the resolutions committee. He is talking with Cyrus Ching of U. S. Rubber Co.

N.A.M. Offers to Cooperate With Goverment and Labor

NEW YORK—In an atmosphere dramatic by reason of the sharp business recession, the National Association of Manufacturers held a memorable and rousing meeting at the Waldorf-Astoria in New York Dec. 7 to 9. This "Congress of American Industry" adopted a constructive platform which stressed the need for the encouragement of private initiative and indicated by speech and action its willingness and eagerness to cooperate with the federal government in lifting the country out of its present economic dilemna.

While the association and the speakers were critical of governmental policies, their quarrel was largely with the means to the end rather than with the end itself. The chief aim, which was apparent in all the sessions, was to help restore industrial peace and prosperity and to champion policies which would be fair to all persons involved. Major interest centered on the final day's program which dealt exclusively with labor policies. A highlight was the N.L.R.B. clinic, a closed session for members only, in which John C. Gall, N.A.M. counsel, asked questions about the application of the Wagner Act and Charles W. Fahy, general counsel of the National Labor Relations Board, answered them. An enjoyable feature and one which drew top attendance was the address of General Hugh Johnson, former N.R.A. administrator.

A statement on employment relations and an outline of employment procedures were among the significant developments which emerged from the Congress. The statement condemned the closed shop and the check-off "no matter what the form of employee organization may be." It declared that "the handling of complaints and grievances and questions of wages, hours and working conditions can best be met by management dealing with its own employees in the light of local plant and community conditions." It asked for amendments to the Wagner Act to make it fair to employers and expressed opposition to compulsory governmental arbitration of disputes.

In its outline of employment procedure, the association recommended a "general wage level at least equal to the wage level for similar work and conditions in the locality, the wage for each job being determined, relatively with other jobs in the plant, with due regard for skill, responsibility, experience, physical demands and hazards which the job requires." It advocated wage plans sufficiently clear to enable the worker to determine promptly the money due him. In connection with hours the association proposed a general standard "fully consistent with the welfare and health of employees considering the type of work and providing for seasonal demands or emergencies with an average work day of eight hours and at least one day of rest in seven."

The Congress sessions came to a brilliant climax at the annual dinner at which Dorothy Thompson, liberal journalist, and Colby M. Chester, chairman of the N.A.M.. delivered addresses. Mr. Chester stressed the fact that American business doesn't have to be drafted in the present emergency, because it has already volunteered. He indicated the readiness of industry to go into the council chamber with labor and the government to help right conditions economically. He ably outlined the creed of American business and of the association and said that "we have without fear or favor tried to analyze ourselves, to point toward the correction of our shortcomings, and to put our own house in order first."

Mr. Chester staunchly maintained that the program outlined by the N.A.M. is fair, is social, is constructive and is liberal. He then said, "If it is not, we are prepared to make it so." He asked, "Has government or labor a better program?" He declared that "we might as well recognize that both employers and union leaders must get off the back fence and act like men of intelligence be-

Main Planks in N.A.M. Platform for 1938

- Encouragement of private initiative which is the basis of competitive American industry. This should be done by offering capital an incentive to invest, by limiting government regulation to prevention of abuses inimical to the public interest, by insuring industry freedom from federal control of prices, wages and hours, by imposing taxes fair in amount and in character, and by constantly increasing research to produce new and wanted products and new jobs.
- Maintenance and extension of sound industrial practices by industry.
- Equitable employment relations throughout industry, including legal and social responsibility of both employers and employees for their commitments and their acts.
- Creation of new and broader markets.
- Constructive efforts to alleviate depression effects, including the leveling of seasonal valleys of production and employment so far as possible.
- Sound government policies, including balancing the federal budget.
- Cooperation with agriculture.
- Opposition to war which results in overwhelming loads of debt and in subsequent depressions.

fore real progress can be made." He put the pertinent question, "Will government sit down with business and labor? Will it put patriotism ahead of partisanship? Is it prepared to recognize that business experience may be a useful asset in our present dilemma?"

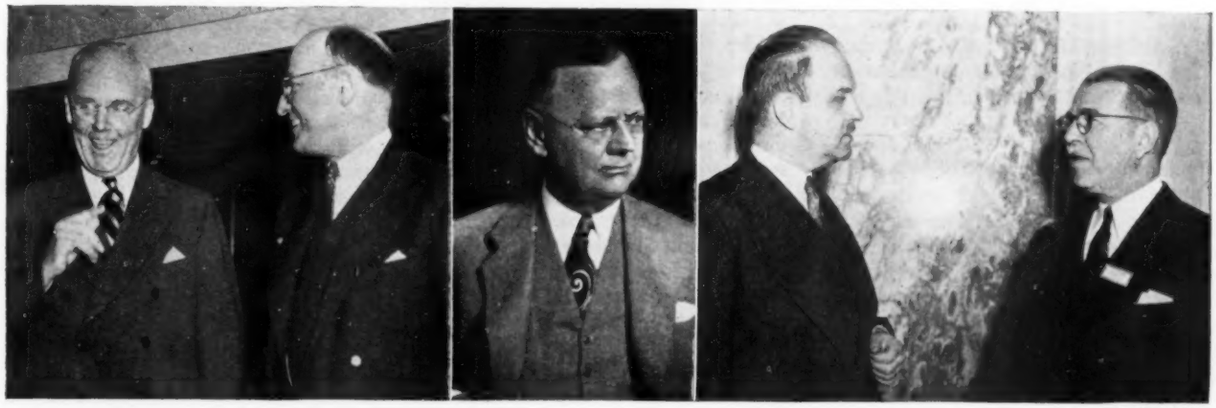
The cost of strikes in this country this year has been close to five billion dollars, estimated Ernest T. Weir, chairman National Steel Corporation, in a paper "Management and Labor Can Get Along." When the final record is written for 1937, it will be found that the average family has paid $160 to $175 as its unwarranted share of this cost. Mr. Weir said that if the idea of collective cooperation could be substituted for collective bargaining, it would be one of the most forward steps taken in industrial relations.

That the machine age is to blame for unemployment and other economic ills was branded as a fallacy by Dr. Robert A. Millikan, president of the California Institute of Technology. He said that only the creation of new machines and new products through scientific research can solve present-day problems. He contended that "the most potent cause both for the extraordinary increase in the well being of the American worker during the last half century and the very large excess in his present economic well being over workers anywhere else in the world is due to the greater us of power machines and other scientific devices here than elsewhere."

Lammot duPont, presided E. I. duPont de Nemours and Company, made the plea to the federal government to give industry a reasonable degree of certainty upon which it can count in planning current and future operations. Said he, "Lift the fog and let us see the road we must travel." Stabilization of tax rates over a definite period, plus a simplification of the tax structure may be almost more important than the actual level of taxes. Great expansion of present employment can only be achieved by the discovery, development and popularization of new products, by broadcasting vastly the market for existing products through lowering their cost, and by maintaining a rule of fair return for all effort, not excepting capital, said Mr. duPont.

"What's Ahead For Business?" was the topic discussed by Dr. Virgil Jordan, president National Industrial Conference Board; by Dr. Lionel Edie, president Lionel D. Edie and Company; and by Dr. E. M. Patterson, University of Pennsylvania. Dr. Edie predicted that the bottom of the present recession will be reached in 60 to 90 days and that a slow but steady upturn will start in the Spring.

Among those reelected as directors-at-large were W. Gibson Carey, Jr., president Yale & Towne Mfg. Co.; Tom M. Girdler, chairman Republic Steel Corp.; Charles R. Hook, president American Rolling Mill Co.; E. T. Weir, chairman National Steel Corp; and George H. Houston, president Baldwin Locomotive Works.



Blank & Stoller

Seen at the N.A.M. meeting—Two famous steel captains, E. T. Weir of National Steel and Tom Girdler of Republic Steel, greet each other (left). W. F. Detwiler, president of Allegheny Steel, is a newly-elected director (center). Warner Seely and Charles J. Stilwell of Warner & Swasey took in proceedings.

Frank Purnell of Youngstown Sheet & Tube, chats with Frank L. Binford of D. A. Lubricant Co. Looking over the gathering is W. Gibson Carey, Jr., president of Yale & Towne. H. W. Prentis, Jr., president of Armstrong Cork, and Walter B. Weisenburger, executive vice-president of N.A.M., solemnly consider the outlook for business.

Production Men Gather at Flint for Session on Automotive Practice

FLINT—Manufacturing executives of automobile companies and their suppliers found ample opportunity to atend the production meeting of the Society of Automotive Engineers in Flint, Mich., Dec. 8-10. Technical papers were presented on such subjects as machining cast-steel pistons, precision forging, welding, finishing with synthetic resins, scheduling of automotive parts for manufacture, grinding and gear cutting. As usual, intimate discussions of possible future developments were confined to the hotel lobby and to private sessions following the meetings.

The sessions were such as to indicate a large growth in interest in the technical subjects under discussion and more open-mindedness and willingness on the part of automotive engineers to talk over mutual problems. From this standpoint the opening session was characteristic of the convention. Leroy Cram, Chevrolet Motor Co., was chairman. N. L. Bean, Ford Motor Co., read a paper for W. F. Pioch of that organization on the casting and machining of steel pistons.

Shot-Blasting Benefits

Of particular interest in the discussion following a paper on precision forging practice by L. A. Danse, Cadillac Motor Division of General Motor Corp., were individual reports of tremendous increases in fatigue life of forged and machined parts resulting from shot-blasting of the finished product. Mr. Danse stated that axleshafts which in the finished ground condition in special duty service would last only 5,000 to 6,000 miles, would run in excess of 30,000 miles when shot-blasted after grinding. Similarly, Mr. Cram said that the new Chevrolet disk-type spring developed for the clutch on 1938 models is now being shot-blasted, making unnecessary high polish grinding and yet providing greater fatigue life.

Mr. Pioch's paper described the casting and machining of Ford cast-steel pistons. He told about a new machine developed by Ford to "tuck" the sand into the pocket of the cheek mold that forms the cored hole of the piston-pin boss. Grooving tools for the piston ring grooves are tungsten-carbide tipped and the method of grinding is largely responsible for their long life between grinds. Ford has designed a vertical rotary-type machine which checks 800 pistons an hour. The company now has under construction an inspection machine which will automatically check all machine operations. It is to be a robot-type machine employing electric photocell devices. In the entire machining of the piston there is less than 0.8 per cent scrap.

Climb-Cutting Splines

There are no short cuts in making good gears, the most economical method being to fulfill the laws and definitions pertaining to the geometry of gearing, stated Charles H. Stanard, Buick Motor Division of General Motors Corp., in a paper on the economical mass production of accurate gears. Buick's problems of manufacture in conection with gears are the attainment of uniformity, accuracy, economy and quantity. Mr. Stanard proceeded to describe in detail the complete production process at Buick.

Experience with climb-cutting as applied to gear hobbing operations was detailed by R. B. Haynes, Spicer Manufacturing Corp., in a paper dealing with recent developments in spline and gear cutting and finishing.

Climb hobbing yields a finish on the sides of the splines superior to that obtainable by conventional cutting, declared Mr. Haynes. It also is accompanied by an increase in hob life of 20 to 30 per cent more pieces per grind. It consumes less power per cubic inch of metal removed, produces little or no burr on the splines. Its value as a production process is not affected materially by coolants, speeds, feeds or other factors in the operation.

Experiments in climb hobbing of gear teeth are interesting, but as yet inconclusive. The finish of the contour is superior but not to the degree observed in splines. Climb hobbing of gear teeth results in a sizable increase in hob life, and power consumption is in the same ratio to conventional hobbing consumption as in the case of splines. Climb hobbing does not affect the accuracy of tooth form, despite apparently opposite findings recently made public.

How the Chrysler Division of Chrysler Corp. purchases, plans and schedules parts for its cars was outlined in detail by David A. Wallace, president and general manager of that division. He brought out the fact that Chrysler has developed a process for precipitating and recovering all the solids from excess paint-spray operations, the material recovered being of the same quality as that originally purchased. This process has been licensed to many large lacquer and synthetic enamel users who are recovering an average of one-third of all paint sprayed at a cost sufficiently low to result in a handsome saving.

Peculiar machining problems in connection with Buick's automatic transmission were discussed by F. C. Pyper, master mechanic of the Buick Division of General Motors Corp. The mechanical equipment for producing the transmission was selected as follows: (1) proven standard machines with latest improvements for turning, milling, cutting and grinding of ordinary parts were bought; (2) specially designed automatic machines for combined operations on related functional surfaces were ordered; (3) specially designed equipment mounted on standard machines to provide accurate locating and indexing from finished surfaces to surfaces on which operations are to be forced was brought; (4) latest designed equipment for hardening was installed to insure the prevention of distortion; and (5) air and temperature-controlled inspection rooms with the latest design of inspection equipment were constructed.

Plastic Flow Important

In his paper on precision forging Mr. Danse brought out the fact that in developing a forging design and a method of forging, the contours must be such that the flow can occur naturally, without internal shear, twists, buckles or waves. This regard for the laws of plastic flow is pre-eminent in precision forging and the close control of surface dimensions is secondary. Close surface dimensional control may amount to no more than limited die life, while proper flow line control involves correct planning of breaking down and roughing out operations, as well as proper sizing in the finishing impression.

Proper forging temperature and die to die sizing will afford dimensional tolerances which are classed as precise. For instance, automotive connecting rods can be produced to ± 0.007 in. and weight tolerances held to less than 3 oz. on a 5-lb. connecting rod. However, a die life of only 1,000 or 1,500 forgings would result if weights were held to within 2 oz. and 5,000 with a tolerance of 2½ oz., with alloy steels. With carbon steels die life of 5,000 forgings can be had with a 2-oz.

Ed Smith, of Seneca Falls Machine Co., and N. L. Bean, of Ford, discuss piston machining, Leroy Cram, of Chevrolet, ran the opening session. L. A. Danse, of Cadillac, talks over matters with C. W. Jinnette of Norton Co.

tolerance, 10,000 with 3 oz. and 30,000 with 4 oz.

Need Better Dies

Forge men, according to Mr. Danse, are crying aloud for better dies so as to be able to afford closer contour and weight control by greater die life or durability. He pointed out that a few years ago Wilbur Sanders at Buick proved that complex upset transmission gear forgings could be made close to size not only outside, but in the holes through them. But the wear on the piercing punches and sizing punches convinced them that the cost was not warranted. It is often cheaper to machine than to forge.

Where stresses are complex, as are the contours, careful development of flow lines is the only means of assuring long life of finished parts. Fatigue failures start from flow-line nuclei in the absence of any surface defect. This was proved to the Cadillac people by research conducted on connecting rod shanks in a specially adapted Upton-Lewis machine, where the arms and jaws were built to bend sections of connecting rod shanks instead of flat test specimens.

Wide flash or uneven, notched or kinked flash, said Mr. Danse, is evidence of improper breaking down of the metal preparatory to finish forging. Wide flash shows that the segregated heart metal has been forced out into the flash and leaves a line of potential weakness along the flash. This is often accompanied by cracking along flash lines during heat-treating.

Theoretically the flow of metal in a forging, said Mr. Danse, should exactly follow the surface contour in highly stressed areas and should follow the main form of the forging throughout. There should be no flash nor other extruded waste metal except at unstressed areas of the forging. Practically, this perfect result is usually too costly, but careful judgment should be exercised in effecting a satisfactory compromise without excessive cost.

The use of infra-red electric light for drying repaired enameled automobile fenders was related by J. L. McCloud, Ford Motor Co. These are carbon-filament lamps of the same type as those used by physicians. Ford assembly lines are equipped with banks of these lights in various sizes and adjustable to any location on the body. The area to be repaired is sanded to be sure of adhesion of the repair coat to the hard baked finish. Enamel thinned with a lacquer-type, fairly fast evaporating solvent is sprayed on. The heat lamps are then arranged at about 12 to 20 in. away and the baking is done in from 5 to 20 min., depending on the size of repair and color. After the repair is dry, it is carefully polished, especially at edges.

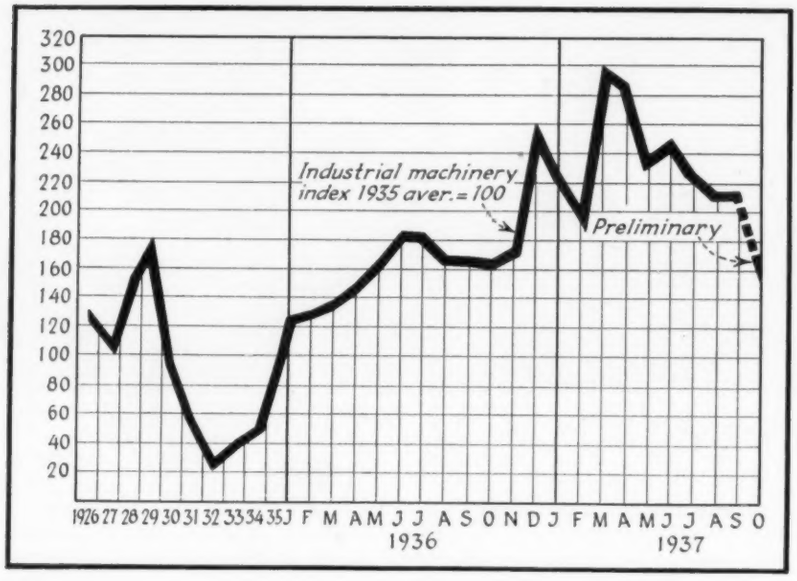
"Clam-Shell Oven"

Success of baking enamels with lights has led to their use for operations formerly done with steam-heated ovens. At the Rouge plant there is an unusual primer drying "oven." This consists of a series of double clam-shells carrying lights spaced so as to heat the bodies and bake the prime in 7 min. instead of the usual hour. The bodies travel on an overhead conveyor. This carries them between two synchronized conveyors that carry the clam shells of lights. The temporary assembly of lights and bodies moves together for the 7 min. and then the body emerges with the lights traveling back to surround another body. Each bank or shell of lights is equipped with a time switch so that if the conveyor be stopped, only 7 min. of baking occurs. If the lights were left too long, an extremely hard surface would result or the solder used over weld areas would sweat out. Other applications of this method of heating are in the form of light tunnels to dry off water after the acid wash and wet sanding.

Sheet Metal Enameling

Mr. Cloud, whose topic was the finishing of automotive parts in synthetic resin enamels, revealed his opinion that the successful dipping of sheet metal parts in synthetic enamel is as outstanding as the enameling of bodies. It was formerly considered impossible to dip successfully colored enamels. This dip finishing, since the sheet metal is of the same color as the sprayed bodies, necessitates a close tolerance limit on the color. To make accurate color matching possible, artificial light sources of daylight "color" are necessary. Said Mr. McCloud, "When we started the color matching lights were of such low intensity of illumination that better types were found necessary. In this we assisted and now have a light source of noon sunlight color as well as "horizon sunlight" that is as searchingly intense as a bright sunny day outside.

R. V. Hutchinson, Olds Motor Division of General Motors Corp., emphasized that grinding wheel selection in the past had been based on empirical knowledge rather than basic research and indicated a need for the latter in a paper on grinding. Welding problems were discussed at a separate session with C. A. Adams, Edward G. Budd Manufacturing Co., and J. S. Williams, P. R. Malory Company, giving papers. The meeting was concluded with a dinner at which Arnold Lenz, of the Chevrolet Motor Division of General Motors Corp., was the speaker.



Machine Index Resumes Drop

The pause in the fall of American Machinist's Index of Industrial Machinery Orders which occurred in September was unfortunately only temporary. October saw a further fall of 48 points, or a total of 133 from the March high.

D. P. Barnum Reelected by Standards Group

Sixteen new national groups have affiliated themselves with the American Standards Association, it was announced at the annual meeting by Dana P. Barnum, who continues as president. Among these new members are the Automobile Manufacturers Association, the American Society of Heating & Ventilating Engineers, the American Society of Refrigerating Engineers, and the National Elevator Manufacturing Industry, Inc.

Fifty-nine new standards were approved during the year. In the mechanical field the standard on large rivets brings to completion eleven years of work. Four important standards that provide greater interchangeability in use of certain machine tool elements have also been approved. Altogether 382 standards are now in force.

Dust Control Equipment Makers Elect Officers

At the recent meeting of the Dust Control Equipment Association in Cleveland, the following officers were elected—chairman, John Hellstrom, vice-president of the American Air Filter Co.; vice-chairman, S. S. Parsons, of the Parsons Engineering Co. Arthur J. Tuscany continues as executive secretary and treasurer. The organization is continuing its work toward developing standards of dust-control practice in cooperation with the Hygiene Codes Committee, American Foundrymen's Association.

N.S.P.A. Elects Officers At Chicago Meeting

Several hundred delegates to the fourteenth annual convention of the National Standard Parts Association gathered in Chicago December 3 to hear the opening address delivered by L. F. Hunderup, assistant general manager, Van Norman Machine Tool Co., and talks by Dale Carnegie and Paul G. Hoffman, president, Studebaker Corp., to discuss the problems of manufacturing and wholesaling and finally to elect officers for the coming year. Members of the N.S.P.A. also joined with other groups at the Automotive Service Industries show, Dec. 6—11.

Officers elected for the coming year include V. C. Hossellman, Siferd-Hossellman Co., Lima, Ohio, who was elected to succeed L. F. Hunderup as president. Other officers elected were L. G. Matthews, Sealed Power Corp., senior vice-president; and V. C. Anderson, Jr., vice-president. E. P. Chalfant continues as executive vice-president and R. W. Procter as secretary of the manufacturers' division. Eight new directors were elected four of whom are in the manufacturers' division: J. E. Adams, Toledo Steel Products Co.; A. G. Drefs, McQuay-Norris Mfg. Co.; L. E. Fogel, The Automotive Specialty Corp.; O. R. McDonald, Manley Mfg. Division, American Chain & Cable Co.

***One Hundred Years in Forging Business*—Kropp Forge Co., Chicago, which originated in Sweden one century ago, dedicated a new $250,000 machine shop on Dec. 4. Raymond Kropp, vice-president, Charles Johnson, secretary-treasurer, Roy A. Kropp, president, and Arthur W. Hellstrom, vice-president and works manager. The plant now covers 10½ acres**

WATCHING WASHINGTON

Both business and administration blamed for slump . . . Railroads ask higher rates to save financial structure . . . Hopes for budget balance fade as federal spending steps up . . . Navy awards ship contracts for 30 million

WASHINGTON — It's a question which is better—a toothache in Florida or a headache in the White House. The President returned from his curtailed vacation to find the Capitol filled with chaos and confusion. It is pretty well agreed that three things are desirable: (1) to cut taxes, (2) to step up federal spending and (3) to balance the budget. The utter futility of combining these three objectives causes all the trouble and demonstrates that economics is still a black art so far as legislators are concerned.

Business blames Washington for the depression; Washington blames business. Business argues that investor confidence is undermined by the efforts of New Dealers to penalize enterprise. In the President's opinion there are three chief reasons for the depression:

1. High prices, containing too large profits, with steel No. 1 on the list and cement a close second. Lower prices would mean greater sales, more employment.

2. Hold off in expansion and replacement by utilities amounting to $1,000,000,000 a year for the last three years according to figures compiled by the SEC. This utility thing the President regards as just a conspiracy to stymie him and his objectives.

3. Failure of the railroads to make necessary improvements. This is the only one of the three which the President regards as having no ulterior motive. He would like to help the railroads but does not know how.

Railroads Ask Raise

Last Thursday the Association of American Railroads flatly told the Interstate Commerce Commission that immediate grant of increased rates is essential if the roads are to escape financial chaos. Prompt relief was refused by the I.C.C., but the President expressed himself as willing to cooperate with the roads rather than resort to government ownership which has been strongly urged in certain quarters.

WPA Administrator Harry L. Hopkins announced that 350,000 persons would be added to the work relief rolls, saying that this number could be carried through the winter without deficit appropriation, assuming that these are not new additions to the unemployed. This action will bring the number on work relief close to 2,000,000.

Hopkin's step is just one indication that government spending will have to be increased. It is known that Secretary Morgenthau is considering some of the loopholes he left in his budget balancing speech. Federal Reserve Board Chairman Marriner S. Eccles has warned that a continuance of the depression would make budget balancing impossible. The President is expected to serve similar notice before long.

The plan to save $113,000,000 by cutting federal appropriations for highways aroused protest as soon as the President advanced it and seems to have found few friends. Already the administration is concentrating its fiscal year purchases during the winter months.

Following the President's instructions to expedite expenditures the Navy has released ship contracts amounting to nearly $30,000,000. Two auxiliaries, a 9,000-ton destroyer tender and an 8,300-ton seaplane tender were awarded to the New York Shipbuilding Corporation. The 1,500-ton destroyer was awarded to the Puget Sound Navy Yard and another to the Charleston, S. C., yard.

According to Chief of Staff General Malin Craig's annual report, the Army is still far short of numerous requirements in certain critical items. These include such items as anti-aircraft guns, fire control directors, anti-tank weapons and longer range rifles. During 1938 the two-battery battalion of mechanized cavalry will be expanded to one of four batteries. With funds made available for next year regular army motorization will be brought to about 66 per cent, and that for the National Guard about 45 per cent.

Gold Likely to Stand

While it would be difficult to forecast what President Roosevelt might do to check the depression were it to grow more and more acute (which he refuses to admit) one thing is regarded as certain—he will not increase the price of gold. Such success as accompanied the advance in price from $20.67 to $35 an ounce was because many other nations were on gold and were not in a position to match that move. Now that all currencies are being managed such action would be matched at once. The only beneficiaries would be the gold producers.

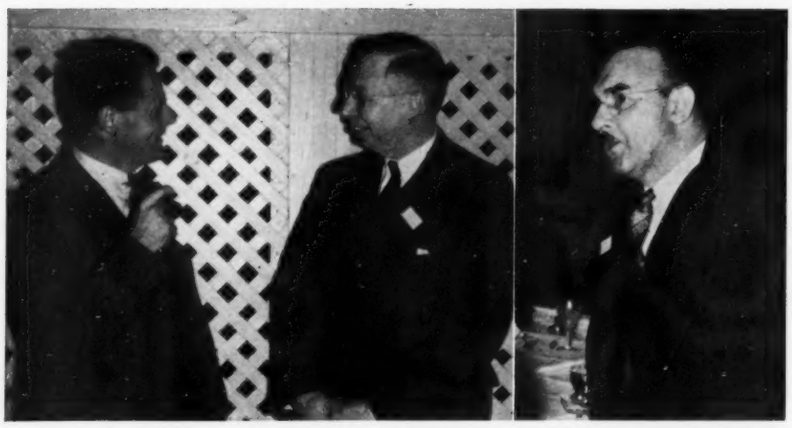
It is expected that the silver subsidy will be continued. Congress would extend it even were the President inclined to stop it. Most mining regions benefit in a minor way only from agricultural benefits. As long as those benefits continue a higher price will be paid for domestically-mined silver.

The National Labor Relations Board seems to have crawled out on a limb on the question of a free press. When NRLB issued a subpoena calling Hartley Barclay, editor of *Mill and Factory*, to appear before it, the right of bureaucracies to gag criticism of its action was brought under fire. In the face of the contention that the subpoena is void because the board had no power to issue it, NLRB must decide whether to prosecute and risk a court defeat or let the whole question drop.

ROLLING ALONG

Nobody on Capitol Hill is happy about the wage-hours regulation bill, the farm bill or the logrolling combination which now seems inevitably forcing both measures to passage regardless of individual demerits of each. City congressmen who crowded the country lads to sign the petition that pried the wage-hour bill out of its pigeonhole in the rules committee morgue, threatening that if they did not the city boys would vote against the farm bill, created a Frankenstein monster. Now they cannot control it, the country boys cannot control it, and the two bills march on to enactment.

A particularly black spot in the picture is that almost any senator or representative will tell his friends privately not only that both bills are indescribably bad, but that, when enacted—and nobody says "if"—it will be almost impossible to unscramble the eggs again. Repeal of laws once put on the books is a tough uphill job, especially when the mantle of "progressivism" can be thrown over them.—CARTER FIELD, *Washington Bureau, McGraw-Hill Publishing Co.*



Roger L. Putnam, president of the Package Machinery Co., tells one to H. H. Leonard, president of the Institute and vice-president of the Consolidated Packaging Machinery Corp. C. H. Lambelet, newly elected director, is president of the N. J. Machine Corp.

Packaging Machinery Institute Holds Meeting

Officers of the Packaging Machinery Manufacturers Institute were re-elected at the annual meeting held at the Garden City Hotel, Garden City, Long Island, Dec. 9. H. H. Leonard, vice-president of the Consolidated Packaging Machinery Corp., continues as president. W. D. Kimball, first vice-president of the Standard-Knapp Corp., and Morehead Patterson, vice-president of the American Machine & Foundry Co., remain as vice-presidents of the Institute.

C. H. Lambelet, president of the New Jersey Machine Corp., is a newly elected director. Other members of the board are H. K. Becker, vice-president and general manager of the Peters Machinery Co.; Roger L. Putnam, president of the Package Machinery Co.; Kendall H. Doble, vice-president of the Pneumatic Scale Corp., Ltd.; G. Prescott Fuller of the Dexter Folder Co.; and C. E. Schaeffer of the Stokes & Smith Co.

The day's discussions centered on such topics as overhead costs, sales problems, taxes and reciprocal tariff agreements. In common with other manufacturers' groups meeting at this time, the Institute recommended repeal of the undistributed profits tax. Some thought the proposed reciprocal tariff with Great Britain may bring sharper competition through imports of machinery, and others did not hold this opinion.

WILLIAM DOEMEL has been made factory manager of the Webster Mfg. Co., Tiffin, Ohio, steel products concern, to succeed CHARLES BEASLEY. K. H. WATERFIELD was recently appointed general manager.

DR. E. H. LESLIE, authority on the chemical process industries, has joined the Blaw-Know Co., Pittsburgh, and will have supervision of design and fabrication of operating units for the chemical and oil-refining industries.

CHARLES W. RAUCH, manager of the technical publications department of the Marlin-Rockwell Corp., has succeeded the late A. A. MCGOWEN as advertising manager and will have charge of both departments.

E. J. BUFFINGTON, former president of the Illinois Steel Corp., died Dec. 9 in Chicago following an operation. He was 74. Mr. Buffington was president of the corporation for 34 years and retired in 1932.

J. JUDSON DEAN, founder of the Cape Ann Tool Co., Rockport, Mass., and for many years a prominent figure in the drop forging business, died at Watertown on Dec. 6. He established a drop forging plant at Muncie, Ind., in 1909 and operated it until 1928.

FREDERICK M. ELLIS, president of the Ellis Manufacturing Co., died in Southington, Conn., Dec. 8, of a stroke at the age of 62.

EUGENE E. WILSON, senior vice-president of the United Aircraft Corp., and general manager of the Chance Vought Aircraft Division, East Hartford, Conn., has been named general assistant to the president of the United Aircraft Corp, retaining his rating as vice-president.

RENSSEKAER W. CLARK, vice-president of the United Aircraft Corp., and general manager of the Sikorsky Aircraft Division, Bridgeport, has been elected vice-president in charge of airplane divisions with headquarters at Hartford.

CHARLES J. MCCARTHY, engineering manager of the Chance Vought Aircraft Division, East Hartford, has been named assistant general manager.

SAMUEL F. PRYOR, JR., Cos Cob, Conn., has been appointed assistant to the president of the American Brake Shoe & Foundry Co. WILLIAM B. GREEN is president.

The Rogers & Brother Silver Co., Waterbury, Conn., a division of the International Silver Co., Meriden, Conn., will be moved to Meriden to occupy the flatware making plant on Butler St. The employees will be given an opportunity to work in Meriden.

The Lincoln Electric Co., manufacturers of arc welding equipment, have opened an office at 412 Title Bldg., Atlanta, Georgia, under the management of ROBERT DANIELS.

The High Speed Hammer Co., Inc., Rochester, recently appointed William Halpern & Co., 53 Park Place, New York City, as sales agents for its precision drilling machines in Massachusetts, Rhode Island and Connecticut.

The Falk Corp., has announced the appointment of the Transmission Engineering Co., 116 New Montgomery St., San Francisco, as its representative in northern California. This office will be in change of A. PEDERSEN.

United States Takes Lead In Machinery Exports

Five years ago England exported a little more machinery than the United States did, while Germany did twice as much foreign business. By a year ago last March England was far behind, and we exceeded Germany's foreign sales of machinery for the first time in years. This October we had shipments about $8,000,000. The preoccupation of these competitors with other urgent matters tended to make the victory easier than seemed possible five year ago. These countries temporarily even became among our best customers.

G. & K. Laboratory Visits New York City

Equipped to test all types of flat belts and to demonstrate the efficiency of the "group drive" for certain applications, the mobile laboratory sponsored by Graton & Knight Co., Worcester, Mass., visited New York City on December 11th. A group of editors from various industrial magazines witnessed a complete demonstration of the equipment while it was parked in a lot adjoining the McGraw-Hill Building.

This laboratory is assembled in a large tractor-trailer unit and is designed to test belts under identical conditions, while the load is varied to simulate actual operating conditions. This laboratory is now touring the eastern states, visiting industrial plants according to a flexible schedule. Operating men at each plant visited are invited to test their own belts.

DETROIT LETTER

Ford schedules 115,000 cars for December as other makers curtail output . . . Ford will spend ten million dollars for new machinery in next two years . . . Amtorg to buy equipment to build new six cylinder

DETROIT—The only bright spot on a winter automotive horizon which looks pretty bleak is the Ford Motor Co. On account of die troubles and late tooling for '38 models Ford was slow getting into production. However in two weeks operations were accelerated from 1,300 to 3,600 units a day and the rate is steadily rising. The aim is to reach 6,000 units daily and hold output there until all dealers are adequately stocked. Ford is hopeful of building 115,000 cars and trucks this month. Employment at Dearborn during December and January will do much to offset layoffs and a drastically-shortened work-week elsewhere in the Detroit district.

Millions for Equipment

Ford looms prominent not only in the present situation, but also in future equipment buying. While it is true that automotive equipment purchases have frozen almost solid, it is pleasant to contemplate the fact that Ford intends in the next two years to spend ten million dollars on new machinery alone. This is part of an expansion program at the Rouge plant to increase capacity. Just why so much money is to be spent for added capacity isn't quite clear, but one factor is believed to have an important influence. Ford is supremely confident that no matter what happens elsewhere, there will not be any labor tie-up at Rouge. On that theory the management is going ahead with a large rubber tire factory within the Rouge grounds, with a centralized tool and die shop and with plans for greatly enlarged press and body operations.

Just now the most vulnerable spot for Ford is its supply of de luxe bodies other than coupes (the coupes are made by Murray Body). These bodies are produced by Briggs, where the labor situation isn't too calm, if current reports are correct. Ford makes all its standard bodies at Dearborn now. Ford is proceeding at full speed with its village industries program and within the next few years it expects to raise the number of small plants to fifty.

The United Automobile Workers appear to be baffled by the problem of organizing the Rouge plant. The union has threatened to resort to strikes at plants of Ford suppliers to cripple Ford, but past experience has proved that this technique doesn't work well. Ford suppliers have been closed down by strikes before with little effect at Dearborn. The fact mustn't be forgotten that Ford has its own method of dealing with labor troubles at suppliers' plants. Harry Bennett, Ford service chief, has probably effected more strike settlements than any federal conciliator in the Detroit area. The U.A.W. realizes too that tie-ups at most of the factories making Ford parts would affect other car makers and would constitute a violation of current agreements with parts makers themselves. However, the union may be compelled eventually to call strikes at parts plants to save its own face in view of its impotence at Ford plants.

Some Large Stocks

Never have more rumors been bandied about Detroit than at present. The report persisted last week that warehouses around the city were bulging with new General Motors cars stored until things got better and that General Motors intended to close down all its plants for two months. G.M. offices were flooded with requests for confirmation of this report, which turned out to be erroneous. As a matter of record, some G.M. divisions have abnormally large quantities of new cars stored in and around Detroit and at other points. So have the Chrysler people. This means that General Motors and Chrysler will limp along at a very slow production pace the next 60 days.

Surprising on first thought, retail sales have been sustained much better in the higher-price brackets than in the lower. Chrysler cars are selling well, while Plymouth, Dodge and De Soto are down. Buick is leading in General Motors with La Salle-Cadillac not far behind. Chevrolet and Pontiac, on the other hand, are slow. Olds is in-between with sales fairly good. Higher-priced Hudsons are selling better than the lower-priced.

The reason for this isn't hard to find. With industrial activity on the skids, employment declining and workers on duty fewer days per week, buying among wage earners and low salary groups has tended to dry up. Business is coming from the higher income groups which usually purchase cars every year or every two years. As a matter of record, motor executives say that they could sell many more new cars than they are today if the market were not glutted with used cars. To see the used cars in stock one should drive along Livernois Avenue in the heart of Detroit's industrial area. More than one Detroit new car dealer is said to have in excess of $50,000 tied up in used cars. There isn't much chance of remedying this situation until early Spring.

Car Prices Hold

There is still little discussion of the possibility of car price reductions during the winter. The decline in materials costs since last April, which has applied to almost everything that goes into an automobile with the exception of steel, has not yet been reflected in lower prices paid by car makers to parts suppliers. It has been offset to some extent too by increases of about 10 per cent in labor costs.

That there will have to be large purchases of new machinery during the Spring goes without saying, since '39 models are scheduled to embody numerous mechanical changes. Meanwhile, equipment buying is at the lowest point in years. The big topic in machinery circles is the pending business to be placed by Amtorg for equipment for a new six-cylinder car to be built in Soviet Russia. The new car is reported to be scheduled to replace the Ford model A which has been produced for several years in Russia. Equipment for machining the engine and transmission will be bought in the United States and total expenditures will run well above two million dollars and perhaps closer to three million. Engineering plans prepared by the Autostroy Organization at Dearborn.

At One Old Timer's Party, **left to right—T. T. Trecker; George Havlista, in charge of apprentices; J. L. Trecker; Theodore Trecker, president of K. & T. and host; Judge Michael Sheridan; John Camm, toastmaster; George Weber, president of the K. & T. Old Timers Club, E. W. Trecker and F. J. Trecker**

Theodore Trecker 50 Years in Machine Tool Business

Theodore Trecker, one of the founders and president, Kearney & Trecker Corp., Milwaukee, celebrated his 50th anniversary in the machine tool business with a dinner for more than 150 of his employees. Included were 60 members of the Oldtimers Club of Kearney & Trecker who have had more than 20 years of service in the company, and 92 apprentices of the company.

Mr. Trecker began his career as a machinist apprentice with Wilken Co., predecessor of Filer & Stowell Co., on Nov. 7, 1887. In 1890 he went with Kempsmith Co., machine-tool makers, and became shop superintendent in 1897. With E. J. Kearney, design engineer, Mr. Trecker opened a shop in 1898 in Milwaukee. The firm began production of milling machines in 1899 and grew from a small shop to a plant with an area of 143,000 sq.ft. Since the death of Mr. Kearney in 1934 Mr. Trecker has carried on the business alone.

Machinery Exports Highest Since 1929

Exports of industrial machinery from the United States during October were valued at $24,438,596, the highest monthly value recorded for any month since July, 1929, and a gain of 53 per cent over the foreign shipments in October, 1936, valued at $16,000,332, according to the Machinery Division of the Department of Commerce.

Foreign sales of industrial machinery for the first ten months of this year were valued at $206,801,869, an increase of 47 per cent over the corresponding period of last year when exports aggregated $140,487,116. All of the major groups shared in this advance, ranging from 20 per cent in other metal-working machinery to 83 per cent in power-generating machinery.

Power-driven metal-working machinery exported to foreign markets in October amounted to $5,647,238, a gain of 45 per cent over the $3,883,006 sales of October, 1936. Increases were registered in most all types of this group, but noticeably in internal grinders, $405,375 compared with $47,294, and knee and column type milling machines, $332,049 against $99,882. Outstanding gains were also made in sales of engine and turret lathes.

Exports of Machinery During Oct., 1937

	October 1937	September 1937	October 1936
Electrical machinery and apparatus	$10,260,459	$8,995,024	$8,818,945
Power generating machinery except automotive and electric	1,533,364	1,322,998	837,195
Construction and conveying machinery	2,349,050	2,065,726	1,636,385
Mining, well and pumping machinery	5,619,140	4,640,089	3,243,102
Power driven, metal-working machinery	5,647,238	3,901,722	3,883,006
Other metal-working machinery	348,697	358,214	290,633
Textile machinery	1,291,253	1,024,801	708,473

Exports of Metal-Working Machinery During Oct., 1937

	October 1937	September 1937	October 1936
Engine lathes	392,572	206,665	129,749
Turret lathes	321,421	376,039	224,707
Other lathes	159,030	89,965	183,983
Vertical boring mills and chucking machines	149,717	193,633	384,243
Thread cutting and automatic screw machines	359,619	238,854	323,599
Knee and column type milling machines	332,049	223,911	99,882
Other milling machines	416,086	162,601	222,407
Gear cutting machines	244,997	156,045	245,177
Vertical drilling machines	41,975	38,082	71,969
Radial drilling machines	13,146	68,288	41,742
Other drilling machines	132,463	104,972	112,792
Planers and shapers	77,277	73,891	54,687
Surface grinding machines	155,488	178,150	85,514
External cylindrical grinding machines	154,324	53,062	104,143
Internal grinding machines	405,375	103,516	47,294
Tool grinding, cutter grinding and universal grinding machines	186,559	188,624	109,835
Other metal grinding machines	132,413	111,079	126,901
Sheet and plate metal grinding machines	275,686	434,606	328,031
Forging machinery	269,696	62,784	127,036
Rolling mill machinery	486,006	77,322	192,978
Foundry and molding equipment	171,756	128,430	95,621
Other power-driven metal-working machinery and parts	769,583	642,203	570,716
Other Metal-Working Machinery			
Pneumatic portable tools	$109,928	$90,598	$84,619
Portable and hand and foot operated metal-working machines and parts	108,426	131,039	86,014
Chucks for machine tools	16,531	17,913	21,030
Milling cutters, machine operated threading dies and taps and similar machine operated metal cutting tools	42,938	66,863	53,123
Other metal-working machine tools	70,874	51,801	55,847

PERSONALS

Phil Huber Becomes Ex-Cell-O President

Phil Huber, vice-president and assistant general manager of Ex-Cell-O Corp., and one of its original organizers in 1919, was elected president and general manager at a meeting of the board of directors, as briefly mentioned previously (*AM*—Vol. 81, page 1160g). He succeeds N. A. Woodworth, who resigned because of ill health.

PHIL HUBER

H. C. Bixby, assistant secretary since 1929, controller since 1932, was elected secretary, treasurer and a director.

Mr. Huber, successively chief inspector, factory superintendent, vice-president and assistant general manager, has been prominently associated with the growth of the company, now one of the largest in the manufacture of precision parts and precision machine tools. He has been responsible for the major machine tool and equipment developments of the company, notably the precision boring machine and the thread grinder.

E. N. BOSWELL, identified with the American Locomotive Co., for the past 40 years, has been appointed general manager of the Dunkirk, N. Y., plant of Alco Products, Inc., a subsidiary, succeeding JOHN S. STEPHENSON, who has been assigned to other duties in New York City.

BENJAMIN F. FAIRLESS, new president of the United States Steel Corp., will be tendered a testimonial dinner by the Pittsburgh Chamber of Commerce on December 20.

R. A. LACKEY, vice-president and plant manager of the Payson Mfg. Co., Chicago, manufacturer of builders' hardware, has retired, but continues on the board of directors.

GUS P. DOLL, who recently resigned as president of the Corcoran-Brown Lamp Co., will become president of the Valvoline Oil Co., on January 1. Mr. Doll also severed connections with the Perma-Maid Co., Inc., a subsidiary of the Electric Auto-Lite Co.

J. R. VAN MOSS, assistant vice-president, American Car & Foundry Co., Chicago, has been appointed western sales manager with headquarters at the Chicago office.

C. T. M. HOUGH has been appointed general manager of the Weber-Knapp Co., hardware manufacturer, Jamestown, N. Y., succeeding the late WYC L. CLARK. He was formerly identified with the Keelei Brass Co., Grand Rapids, Mich.

CARY D. TERRELL, vice-president, American Car & Foundry Co., Chicago, has resigned because of ill health, effective Jan. 1. He has been with the company since 1910, and has been in the Chicago office since 1919.

JOHN F. MACENULTY, vice-president in charge of sales, the Pressed Steel Car Co., Inc., has been elected president and a director. GEORGE H. FLEMING, vice-president, has been made executive vice-president.

EARNEST P. WAUD, vice-president since 1919 of the Griffin Wheel Co., Chicago, has succeeded FRANK L. WHITCOMB as president. Mr. Whitcomb is now vice-chairman.

Power Transmission Group Formed in London

As a result of the success of the Power Transmission Council in acquainting American industry with the advantages of the group drive, a similar association, the Power Transmission Association, has been formed in London. Headquarters are at the Aldwych House, Aldwych, W.C., England. Membership in the association is growing and a research engineer has been engaged to collate facts relating to British industry.

Leipzig Fair

The historic Leipzig Trade Fair will hold its 1,979th session from March 6-14. To accommodate new exhibits, two halls, with over 200,000 sq. ft. of display space, will be added to the 51 exhibition halls heretofore in use. The Spring Fair will include some 10,000 exhibits of every industrial and art product assembled from 21 countries, including the United States.

OBITUARIES

C. H. CHAMPLAIN

C. H. CHAMPLAIN, formerly works manager of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., died Dec. 2. Mr. Champlain retired in 1934 after 36 years with the company, having begun as an assistant foreman.

LOUIS D. BIERSACH, president of Biersach & Niedermeyer Co., Milwaukee, died Nov. 27 at the age of 92.

EDWARD J. STANEK, president of the Stanek Tool & Mfg. Co., Milwaukee, died Dec. 3, aged 57.

GEORGE THOMAS, 3rd, treasurer of the Lukens Steel Co., died Dec. 4.

JOHN G. REISING, general manager of the Cincinnati Electric Tool Co., died November 27 after a prolonged illness. Mr. Reising was one of the pioneers in the electrical tool business and had been associated with the Cincinnati Electric Tool Co., for a period of nearly 30 years.

DR. GARDNER C. ANTHONY, dean emeritus of the Tufts Engineering School, former director of the mechanical department of the Rhode Island School of Design and founder of the Rhode Island Technical Drawing School of Providence, died at New Rochelle, N. Y., on Nov. 29 at the age of 80. He was a past-president of the Society for the Promotion of Engineering Education, and for some years was connected with the Brown & Sharpe organization. Dr. Anthony was the author of a number of works on mechanical drawing, machine design and descriptive geometry.

ROWLAND L. RICKWOOD, a mechanical engineer on the staff of the Blanchard Machine Co., Cambridge, Mass., died suddenly on Nov. 30 of a heart attack, at the age of 45.

JAMES S. MERRITT, former president of The Merritt & Co., Philadelphia, metal locker manufacturer, died November 29 at the age of 73.

H. L. STINARD, vice-president of the Federal Gear, Inc., Cleveland, died November 29 at the age of 46.

GILES W. MEAD, 71, one of the three founders of the Union Carbide & Carbon Corp., died December 4 in Beverly Hills, Calif. He was active in the company as director, vice-president and treasurer until his retirement two years ago.

DENNIS F. CULLINAN, purchasing agent of the Buffalo Bolt Co., North Tonawanda, N. Y., died recently at the age of 69.

ARTHUR L. DEVONSHIRE, mechanical superintendent, Howard Clock Co., Waltham, Mass., died November 30, following an operation.

M. N. HURD, president and general manager of the Ingram-Richardson Mfg. Co. of Indiana, Frankfort, Ind., died November 26. Mr. Hurd was 61 and he had been with the company for 21 years as general manager.

H. G. KREISSL, western division manager of the American Radiator Co., Evanston, Ill., died November 29. Mr. Kreissl, who was 53, has been associated with the company for 21 years.

IRA S. WILLIAMS, a frequent contributor to *American Machinist* died in Philadelphia on November 21.

BUSINESS ITEMS

Thomas Prosser & Son, importers, engineers and dealers in steel, mechanical specialties and machinery, and American representative since 1851 of the Krupp Steel Works of Germany, have moved from their old address, 15 Gold St., New York, N. Y., to larger and more modern offices at 120 Wall St. The Prosser firm was in its old building for 92 years. The business was established by Thomas Prosser in 1845 and is being carried on by his great-grandson, Roger D. Prosser.

George Gorton Machine Co., Racine, Wisconsin, is to be represented on the west coast by FRANK O. RIFFLE, formerly with Kearney & Trecker, European sales manager for Monarch, and more recently with Milt Schmitt, machine tool dealer, Milwaukee. Mr. Riffle will be located at the Los Angeles office of Moore Machinery Co.

Michiana Products Corp., Michigan City, Ind., has added H. J. GEORGEN to its sales staff for heat-resistant and stainless-steel alloy castings. Mr. Georgen will be stationed at 80 East Jackson Blvd., Chicago.

A large factory will be erected at Twelfth Street and Pachappa Ave. in Riverside, Calif., near Los Angeles, for the Citrus Machinery Co. It will cover an area of 240x260 ft.

Foote Bros. Gear & Machine Corp., Chicago, has appointed WALTER A. HOPPE, 948 South Grand Ave., Los Angeles, Calif., as representative in the southern part of that state.

The Continental Can Co. has purchased a one-story factory building at Ashland Avenue and 37th St., Chicago. The building has an area of approximately 50,000 sq. ft. and is to be remodeled and used as a machine shop.

High Speed Hammer Co., Inc., 315 Norton St., Rochester, N. Y. has appointed the H. A. Smith Machinery Co., Erie Blvd., East and South Townsend Sts., Syracuse, N. Y., as sales representative for drilling machines in the eastern part of upstate New York. The company has also appointed W. S. GALLAGHER, 1807 Elmwood Ave., Buffalo, as sales representative for drilling machines in that part of New York State lying west of Rochester, including Erie County, Pa.

MEETINGS

AMERICAN ENGINEERING COUNCIL. Eighteenth annual assembly, Jan. 13-15. Hotel Mayflower, Washington, D. C.

AUTOMOTIVE ACCESSORY MFRS. ASSOC. Eleventh annual exposition, Feb. 28-Mar. 1. Port Authority Bldg., New York.

INTERNATIONAL AIR SHOW. Exhibit of equipment and supplies, Jan. 28-Feb. 6. International Amphitheatre, Chicago.

INTERNATIONAL HEATING & VENTILATING EXPOSITION. Jan. 24-28. Grand Central Palace, New York.

NATIONAL MOTOR BOAT SHOW. Jan. 7-15. Grand Central Palace, New York.

NATIONAL RAILWAY APPLIANCES ASSOCIATION. March 14-17. Chicago.

AMERICAN MANAGEMENT ASSOCIATION. Eighth packaging exposition, March 22-25, Palmer House, Chicago.

SOCIETY OF AUTOMOTIVE ENGINEERS. Annual meeting, Jan. 10-14. Book-Cadillac Hotel, Detroit.

PATENTS

November 23, 1937

Metal-Working Machinery

Machine for Grinding Gears. Edward W. Bullock, Clarence T. Galloway, Leonard O. Carlsen, and Robert S. Condon, Rochester, N. Y., assigned to Gleason Works, Rochester, N. Y. Patent 2,099,674.

Machine for Grinding Tools. Stuart A. Cogsdill, Detroit, Mich., assigned to Cogsdill Manufacturing Co., Inc., Detroit, Mich. Patent 2,099,724.

Material Working Apparatus, Milling Machine. Ernest J. Svenson, Rockford, Ill. Patent 2,099,776.

Washer Placing Machine. Wilbert H. Patten, Trenton, N. J., assigned to Trent Machine Co., Trenton, N. J. Patent 2,100,015.

Parts and Accessories

Control Device. William H. Richards, Dayton, Ohio. Patent 2,099,706

Variable Speed Gear Transmission. Charles O. Hall, East Orange, N. J. Patent 2,099,734.

Flexible Coupling for Power Drive. Adolph F. Grodhaus, Baytown, Tex. Patent 2,099,848.

Coil Stripper. William H. Blount, West Brookfield, Mass., assigned to Sleeper & Hartley, Inc., Worcester, Mass. Patent 2,100,046.

Processes

Method of and Means for Etching Metals. Donald Aubrey Marshall, Toronto, Ontario, Canada, assigned to Etched Products Inc., Detroit, Mich. Patent 2,099,697.

Tools and Accessories

Free-Chain Hoist. Frederick W. Coffing, Danville, Ill. Patent 2,099,676.

Device for Solving Relative Movement Problems. Russell Willson, United States Army. Patent 2,099,713.

Thread Cutting Chaser. Albert F. Breitenstein, New Haven, Conn., assigned to the Geometric Tool Co., New Haven, Conn. Patent 2,099,721.

Buffing Wheel. Wayne S. Thomas, Detroit, Mich. Patent. 2,099,777

Indicating Extensiometer. Augustus B. Kinzel, Flushing, N. Y., assigned to Union Carbide & Carbon Corp., New York, N. Y. Patent 2,099,896.

Wrench. Carl H. Leonard, Wakefield, Nebr., assigned to John Ashford, Winnebago, Nebr. Patent 2,100,034.

November 30, 1937

Metal-Working Machinery

Machine Tool—Turret Lathe. William J. Burger, Shaker Heights, and Chrysanth M. Mirossay, Cleveland, Ohio, assigned to the Warner & Swasey Co., Cleveland, Ohio. Patent 2,100,899.

Parts and Mechanisms

Pressure Fluid Motor. Elmer G. Gartin, Claremont, N. H., assigned to Sullivan Machinery Co., Massachusetts. Patent 2,100,325.

Castellated Nut Blank. William McLure Rosborough, Charlotte, N. C. Patent 2,100,357.

Pressure Fluid Motor. Elmer G. Gartin, Claremont, N. H., assigned to Sullivan Machinery Co., Massachusetts. Patent 2,100,541

Clutch Mechanism for Power Operated Portable Tools. Charles W. Ripsch and Bernard H. Wuebben, Dayton, Ohio, assigned to the Buckeye Portable Tool Co., Dayton, Ohio. Patent 2,100,552.

Machine Tool—Form Turning Set-Up. Wilbur C. De Graff, Cleveland Heights, Ohio, assigned to the Warner & Swasey Co., Cleveland, Ohio. Patent 2,100,945.

Grinding Wheel Truing Device. Gardiner S. Gould, Lunenberg, and Elphege D. La Fleur, Lancaster, Mass., assigned to Fitchburg Grinding Machine Corp., Fitchburg, Mass. Patent 2,100,954.

Chuck for Camshafts and the Like. William F. Groene, Cincinnati, Ohio, assigned to the R. K. Le Blond Machine Tool Co., Cincinnati, Ohio. Patent 2,100,955.

Processes

Method of Producing Tapered Gears. Ernest Wildhaber and Allan H. Candee, Rochester, N. Y., assigned to Gleason Works, Rochester N. Y. Patent 2,100,705.

Method of Flash Welding. Numan R. Stansel. Schenectady, N. Y., assigned to General Electric Co., New York. Patent 2,100,880.

Tools and Accessories

Buffing Wheel. Stephen W. Lippitt, Cleveland, Ohio. Patent 2,100,340.

Taper-Thread-Cutting Tool. Albert F. Breitenstein, New Haven, Conn., assigned to the Geometric Tool Co., New Haven, Conn. Patent 2,100,376.

Collapsible Tap. Frederic Nell, Waynesboro, Pa., assigned to Landis Machine Co., Waynesboro, Pa. Patent 2,100,448.

Thread Forming Mechanism. Frederic Nell, Waynesboro, Pa., assigned to Landis Machine Co., Waynesboro, Pa. Patent 2,100,449.

Vise. Lester E. Mershon, Los Angeles, Calif., assigned to Fray-Mershon, Inc., Los Angeles, Calif. Patent 2,100,513.

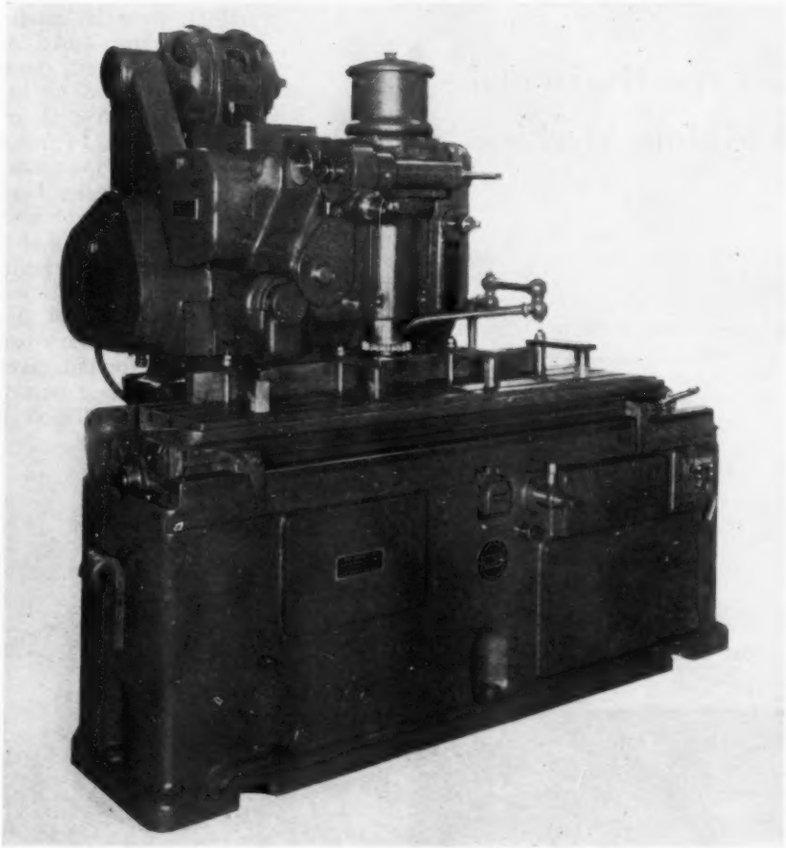
Welding Electrode. Hugo W. Hiemke, Milwaukee, Wis., assigned to A. O. Smith Co., Milwaukee, Wis. Patent 2,100,545.

Die Construction. Edwin A. Bierwirth, Detroit, Mich., assigned to Kelsey-Hayes Wheel Co., Detroit, Mich. Patent 2,100,683.

Screw Threading Die. Max A. Slotta, Chicago, Ill. Patent 2,100,724.

Die Structure. Merle E. Halstead, Owego, N Y. Patent 2,100,847.

SHOP EQUIPMENT NEWS



Fellows No. 3-48 and No. 3-60 Automatic Rack Shapers

Designed for high-production cutting of spur and helical tooth racks, the No. 3-48 and No. 3-60 rack shapers offered by The Fellows Gear Shaper Co., Springfield, Vt., are identical with the exception of capacity for length of rack cut. The No. 3-48 machine will cut rack lengths up to 48 in. and 3-in. face width; whereas, the No. 3-60 will cut rack lengths up to 60 in. Position of the bed, when the cutter is in action on the work, is controlled by a feed cam which, in conjunction with change gears, controls the depth of cut and the feed per stroke of the cutter. Saddle carrying the cutter-spindle is of the "relieving" type.

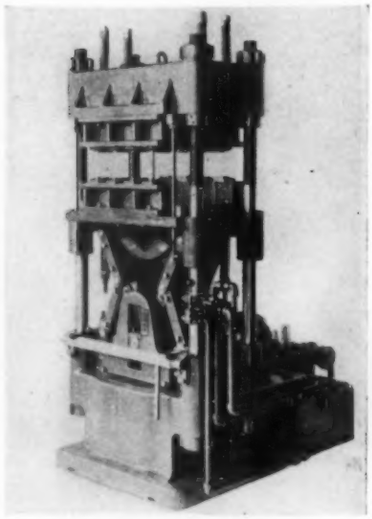
Operation of the machine is claimed to be simplified by the use of a complete electrical control, comprising pushbuttons and selector switches. These switches can be set by the operator so that the cutter can be operated from either end of the rack or in the center of the rack. Control of the depth or feed and traverse feed motion, as well as stopping the machine when the rack is completed, is by means of these switches.

These machines can be used to finish a rack in either one or two cuts by the setting of the selector switches. Operation for the second cut is automatic, without any attention on the part of the operator. Upon completion of the roughing cut, the cutter is automatically fed into finishing depth, then the depth feed is disengaged and the traverse feed engaged to traverse the rack table in the opposite direction.

Specifications: Maximum length of rack, 48 or 60 in.; maximum face width of rack piece, 3 in.; maximum pitch, spur, $\frac{4}{5}$ diametral; maximum pitch, helical, 5 diametral; maximum helical angle, standard guides, 30 deg.; approximate pitch diameter of cutter, 5 in.; width of working surface of table, 12 in. Over-all length of No. 3-48 machine is 82 in. while that of the No. 3-60 shaper is 106 in. Net weight, with motors and electrical equipment, is 9,300 lb. for the small unit and 10,100 lb. for the 60-in. machine.

Standard Molding Presses

The self-contained molding presses offered by The Standard Machinery Co., Mystic, Conn., have been improved to permit adapting them to a wide range of pressures. For continued maintenance of pressure, a simple adjustment in the high-pressure pump release valve changes the



pressure delivered on the platen from total capacity down to approximately ⅓ of rated capacity.

These self-contained molding presses are made in 50-, 100-, 150- and 300-ton models. They are shipped completely assembled, with the exception of piping between the pump and the machine.

The units have a triple toggle, hydraulically operated, with pressure supplied by means of a rotary two-stage pump. Hydraulic cylinder and ram are located in the center of the press and operation is controlled by a single lever on the four-way valve. Press closes under low pressure, normally set at 150-200 lb. per sq. in. pressure. As the press closes on the material, the low-pressure pump automatically cuts out at a pre-determined pressure and the high-pressure pump carries the pressure up to the pre-determined point. The pump then maintains this pressure until the operation is completed.

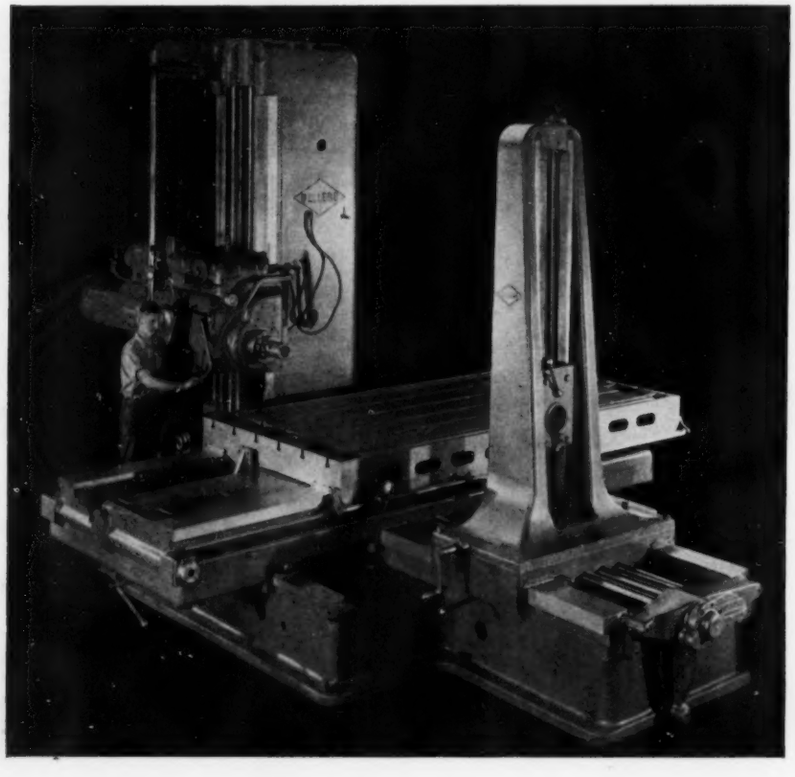
Sellers No. 504 Table-Type Horizontal Boring, Drilling and Milling Machine

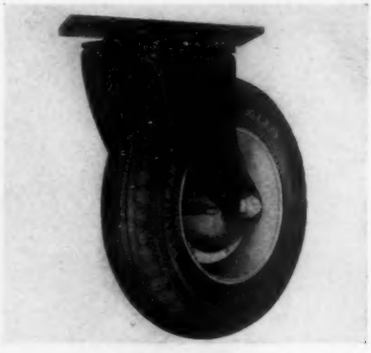
Using the same head as the No. 504 Type A floor-type horizontal boring, drilling and milling machine, previously described (*AM*—Vol. 81, page 1109), the No. 504 Type C table-type machine features a complete power unit from the motor to the spindle nose in the head. This unit contains the forward and reverse driving clutches, all speed and feed changes and hand and power traverse to both spindles, head, saddle and table. Driving motor is mounted on the head, giving a short application of power to the cutting tools. One 15-hp., 1,750 r.p.m., a.c., 3-phase, 60-cycle, 220- or 440-volt, constant-speed motor furnishes the power for all movements of the machine. A separate motor drives the pump for the coolant system.

Table is of deep box-type construction and is square locked to the saddle. Cross feed nut revolves in pre-loaded, anti-friction bearings. Table clamps are located in the saddle and are always in line with the spindle, preventing feeding pressure from cocking the table. Both clamps are actuated by a single, self-equalizing lever. Limit trips are provided at the extreme ends of the table stroke. Adjustable feed trips are provided for production milling. Tables are available in sizes ranging from 36 x 72 in., up to 60 x 120 in. Cross feed ranges from 60 in. to 108 in. and width of bed, across ways, ranges from 36 in. to 108 in.

Outboard upright is bolted and doweled to a saddle on the bed. This construction is claimed to permit quick, easy removal of the upright for long work without disturbing the gibs and clamps on the saddle or the upright moving mechanism. Outboard bearing block has a screw adjustment for realigning the bearing with the spindle if necessary.

Specifications: diameter of spindle, 5 in.; Morse taper in spindle, No. 7; spindle feeding stroke, 36 in.; maximum distance from center of spindle to top of table, 60 in.; size of column at bed, 40 x 43 in.; number of spindle speeds, 24; range of spindle speeds, 5.8 to 334 r.p.m.; number of feeds to spindle, head, table and saddle, 24; range of feeds per revolution of spindle, 0.0025 to 0.625 in. Precision measuring equipment furnished with this machine consists of two sets of dial indicators, a micrometer and V-bars with adjustable stops for pin gages. A magnetic, non-reversing, starting and pushbutton control station is provided.





Musselman "Doenut" Caster Swivel Fork

A 10 in. high by 2¾ in. diameter tire is used with the "Doenut" tired caster swivel fork offered by Musselman Products Co., 6311 St. Clair Ave., Cleveland, Ohio. The low-pressure tire is fitted on a standard 4½-in. diameter cadmium-plated steel wheel of double disk type construction. Fork is made of heavy-gage pressed steel and swivel operates on a double ring ball bearing. Wheel is equipped with adjustable ball bearings. This fork may be furnished either with a flat plate or a stud, so that it may be adapted to any type of unit. The flat-plate model, shown in the accompanying illustration, is 11¾ in. high. Load capacity of either type is 225 lb. per wheel.

Better than they need be

. . . that's what buyers say when they examine the new Parker-Kalon Cold-forged Socket Screws. These new Screws have set a higher standard of quality that wins the unqualified approval of engineers and production men.

There are good reasons for the excellence of these new Screws. They are the result of more than two years of intensive research and development work . . . and the unequalled Parker-Kalon Laboratory facilities for securing and controlling the strength, precision and other essential qualities of socket screws.

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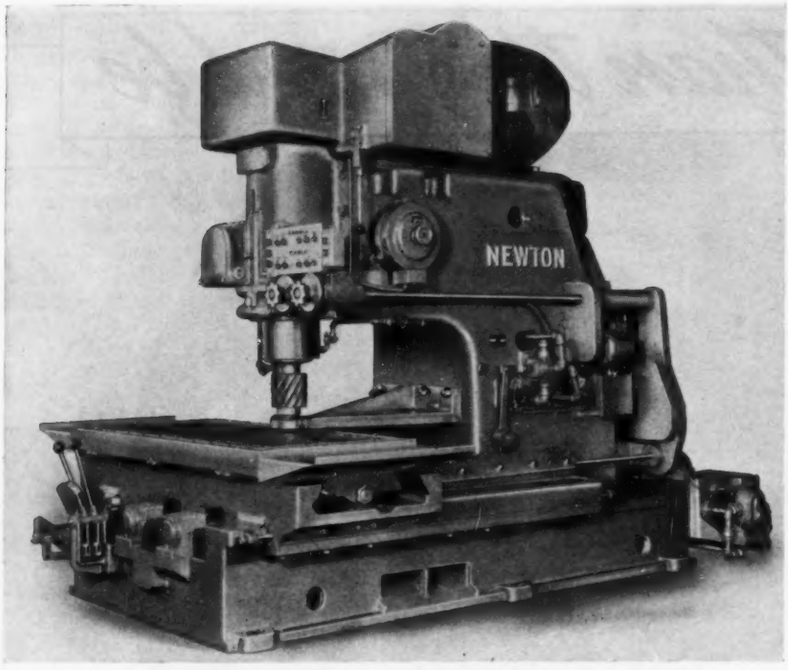
- ☑ *Faultless* **DESIGN**

PARKER-KALON *Cold-forged* **SOCKET SCREWS**



Newton N-25 Heavy-Duty Profile Milling Machine

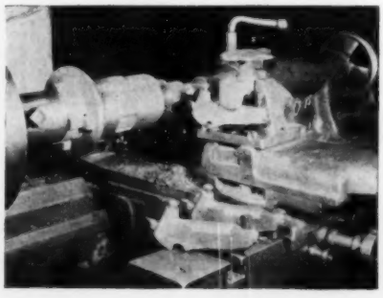
Designed for profiling radius links, eccentric cranks, link cheeks and other general-purpose profile milling of casting and forgings, the Type N-25 heavy-duty vertical profile milling machine shown has been announced by Newton Div., Consolidated Machine Tool Corp., Rochester, N. Y. Among the features claimed are simplicity of control and ease with which longitudinal and transverse movement of the table are obtained.

Two levers, located at the front of the machine within easy reach of the operator, control the rate of feed and rapid traverse. One controls the saddle and the other the table. Power movements of saddle and table, which are by hydraulic screw-feed, are controlled by banks of push-buttons mounted on front of the machine. Hand control of table and saddle feed is provided by dials which operate through follow valves. When hand feeding, valve centers are moved by the dials and the table follows only as far as the dial is turned. Rate of movement can be instantly set or changed. One movement of the table may be by power feed and the other by hand if desired.

This machine is of unit-head type construction, the spindle head and its drive motor being built as one unit and fastened to the upright column. Variable-speed drive motor is mounted on the head and drives the spindle through V-belt and quick change gears to give a wide range of spindle speeds. One hydraulic pump, connected to two hydraulic motors, actuates movement of table and cross slide. Each is independent of the other. The machine illustrated has a 27 x 60-in. work table, with a transverse travel of 30 in. and a longitudinal travel of 52 in. Spindle is 6-in. diameter and spindle sleeve has vertical adjustment of 12 in. Other sizes can be built.

"Lathetule" Toolholder

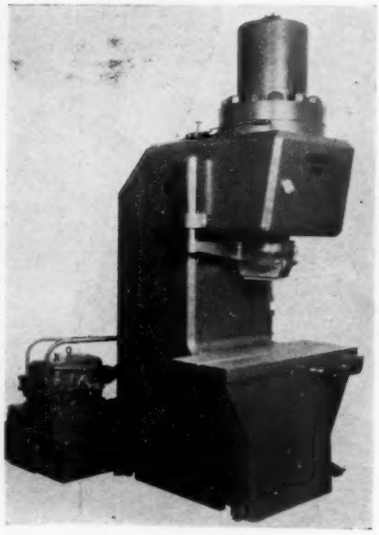
Semi-turret-lathe operation of an engine lathe is claimed to be possible with the "Lathetule" offered by H. J. Fausnaugh, 122 North Main St., Three Rivers, Mich. This device consists of a quick-acting, positive-clamping fixture which replaces the tool post. Special holders are used, one for each operation. These are locked in the Lathetule and the holders are claimed to be replaced accurately in the same position when changing from one tool to another.



To change tool holders, the handwheel is released approximately one-third turn and flipped to the right. The holder is then removed and replaced with the one required. Handwheel is then returned and tightened.

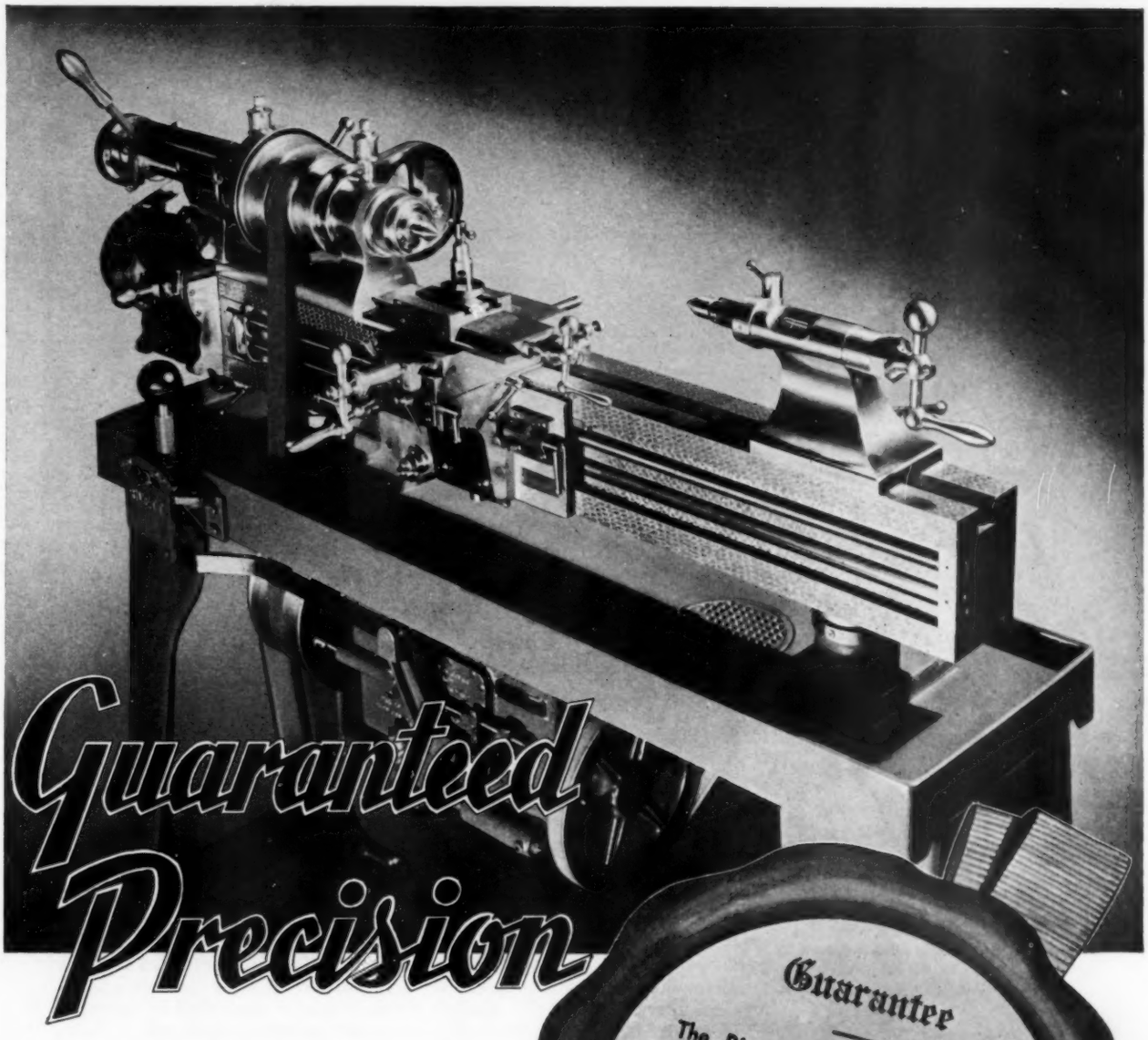
Oilgear 200-Ton Straightening Press

Large front axle I-beams for heavy trucks and buses are straightened on the 200-ton gooseneck press shown in the accompanying illustration. Designed and built by The Oilgear Co. 1319 W. Bruce St., Milwaukee, Wis., this press is of all-steel welded construction, plates up to 3-in. thick being used in the main section of the frame. The complete press weighs approximately 19,000 lbs. It is 120 in. high and occupies a 72 x 88 in. floor space.



Sensitive control of the variable ram movement enables the operator to bring the ram into contact with the work without impact and to deflect the piece to the desired amount without overrunning. Both the speed and stroke of ram can be present, or selected at will from zero to maximum. Full tonnage is available at all speeds and the power required is always in proportion to the resistance met.

Fluid power is supplied by an Oilgear Type DH-2025 two-way variable displacement pump driven by a 15-hp. direct-connected motor operating at 1,200 r.p.m. This arrange-



Guaranteed Precision

Guarantee

The Rivett 608 will turn or bore within 0.0001" in six inches — work held in collet, and turn between centers within 0.0001" in six inches. The Rivett 608 will face to eight inches diameter within limit of 0.0002" concave, 0.0000" convex. The Rivett 608 will cut threads within 0.0005" in twelve inches, or within 0.0003" in any three inches, or within 0.0002" in any inch of a specimen piece.

The Guaranteed Precision Limits of the Rivett 608 back-geared screw cutting lathe are achieved by perfection in design, the use of materials of highest obtainable quality and the finest of workmanship checked by accurate gauging and inspection devices. This guaranteed precision is retained for long periods of time by reason of proportionately great slide areas, vibrationless drive, and three point bed mounting.

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.
PIONEERS IN BENCH LATHE DEVELOPMENT

ment provides a maximum ram down speed of 38 in. per min., and a maximum ram up speed of 76 in. per min. at pressures up to 2,500 lb. per sq. in.

Other specifications include: maximum stroke, 12 in., distance from end of ram to top of table, ram down, 26 in.; depth of throat, 12 in.; width of table, 18 in.; length of table, 50 in.; height of table from floor, 36 in.

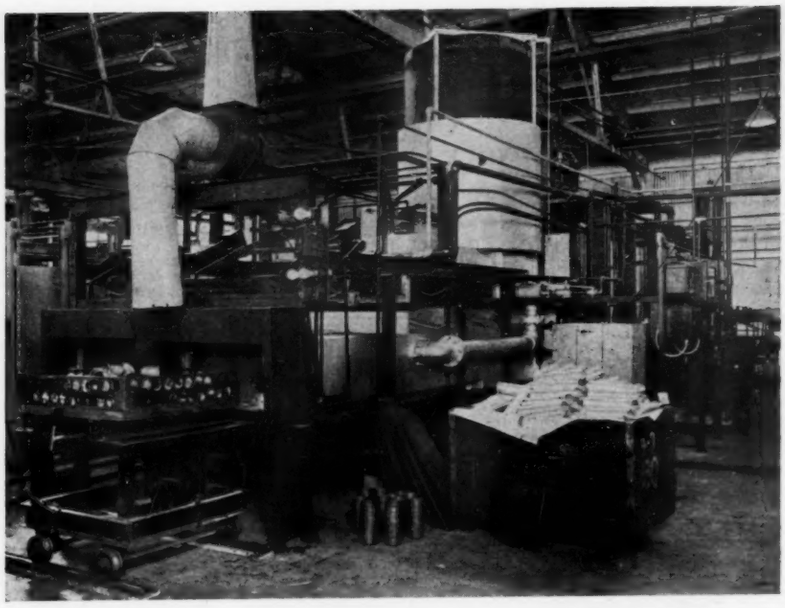
Hisey-Wolf 2-Wheel Precision Grinder

Made in six sizes, ranging from 1 to 10 hp., and arranged for wheels from 8 to 20-in. diameter, these two-wheel, wide-range precision lathe grinders, are offered by The Hisey-Wolf Machine Co., Cincinnati, Ohio. They are claimed to be particularly adapted for grinding rolls, where end space is limited. The same grinding wheel can be transferred from one end to the other, or two wheels can be used.

All units are powered by constant-speed dynamically-balanced a.c. or d.c. motors. A dovetail slide, with screw feed, affords rapid adjustment of the wheel to the work. Direction of rotation of the grinding wheel is reversible by reversing the motor. Oil put into the machine is filtered automatically and the bearings are protected with combination labyrinth and contact seals.

CMD "Superfilm" Lathe Center Oil

"Superfilm" lathe center-point oil, offered by Chicago Manufacturing & Distributing Co., 1936 West 46th St., Chicago, Ill., is said to be free from animal and vegetable fats This mineral oil is recommended for use on lathe centers, lathe steady and center rests, milling machines, universal grinders, cams, thrust bearings and other bearings requiring high film strength lubricants. It is claimed that a drop or two is all that is required on the lathe center for normal operating loads.



E.S.C. Radiant-Tube Fired Recuperative-Type Furnace

A return recuperative-type furnace for scale-free annealing of miscellaneous stampings of various shapes and sizes, developed and manufactured by The Electric Furnace Co., Salem, Ohio is shown in the accompanying illustration. These stampings are loaded into skeleton-type trays or pans and are pushed automatically into the furnace through a lock chamber. The material then passes into a recuperating chamber, through which the pans progress at regular intervals into the heating chamber. At the far end of this chamber, the pans are conveyed automatically across the heating chamber to a return, or discharge, line and then automatically pushed back through a return line in the recuperative chamber and out into the lock chamber onto a transfer car for unloading. Very little heat is said to be carried out of the furnace, as the heat from the outgoing stampings is used to preheat the incoming material before the parts enter the annealing zone.

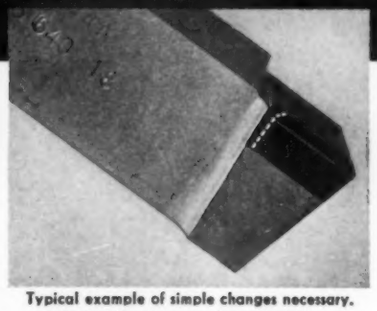
This furnace is equipped with recuperative-type gas-fired radiant tubes. Waste gases are utilized to pre-heat the incoming combustion air before it enters the combustion chamber, thus requiring less fuel and making for economical operation. Products of combustion leave the furnace at a low temperature. By admitting the necessary combustion air throughout the entire length of the burning chamber of these tubes, positive mixture of air and gas is provided where it is needed for perfect combustion. This is claimed to provide an even temperature over the entire length of the tube, making it possible to maintain uniform temperature throughout the entire furnace chamber. These radiant tubes are located both below the hearth level and in the roof of the furnace, thus heating the material uniformly from above and below. Tubes are divided into two separately and automatically controlled zones. Each zone is controlled by means of a proportioning-type control valve which is automatically controlled.

The equipment shown has capacity for annealing 3,300 gross pounds per hour at a temperature of 1,650 F. An "Elfurno" gas generator is used for producing the protective atmosphere used in this equipment.

Houghton Salt Bath "Liquid Heat 980"

Claimed to be a good medium for tool hardening and production reheating purposes, where an absolutely neutral bath is desired, but where a high operating temperature is not necessary, "Liquid Heat 980," announced by E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa., has a melting point of 980 F. Its working range is 1,100 to 1,550 F. Unit weight, in the solid form, is 156 lb. per cu. ft. In the liquid form the unit weight is 145 lb. per cu. ft.

how a well-known plant SAVED 23% on the Cost of Cemented Carbides



Typical example of simple changes necessary. Dotted line shows tip formerly used.

. . . by Adapting their CARBOLOY Tools to the New Standard-Size Tips!

Just a few strokes of the draftsman's pencil . . . a few minor tool design changes . . . and down went the cost of cemented carbide tools for a well-known manufacturer of brake drums, hubs and other automotive products. Same high-quality tool performance . . . at an average reduction of 23% in cemented carbide costs on 16 different styles of tools.

Here's how your plant can save also: Get Catalog M-37 showing the new standard Carboloy tips in 150 sizes, 3 styles. Check these tips against the ones you are now using on your present cemented carbide tools. Then . . . in every case possible . . . make a few simple changes in tool design and replace the more costly, special Carboloy tips with the new standard-size Carboloy tips. Usually, only a minor change, in no way affecting tool performance, is necessary.

Switch to the new standard-size Carboloy tips . . . and save from 15% up!

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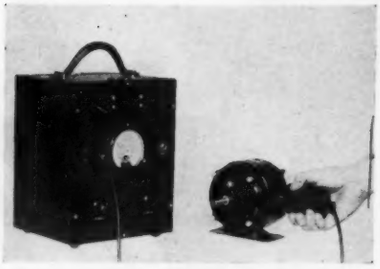
U.T.D. No. 1 Cutter Grinder

Cutters up to 12-in. diameter or reamers up to 24-in. long can be ground on the No. 1 universal cutter and reamer grinder announced by Union Twist Drill Co., Athol, Mass. A cup form wheel is used to give a flat clearance and a strong cutting edge. Spindle is of hardened and ground steel.

Table is mounted on roller bearings and is reciprocated by rank, pinion and handwheel. Fixtures can be furnished for grinding face mills and for grinding the side teeth of side mills. Another fixture is offered for use in sharpening the end teeth of end mills.

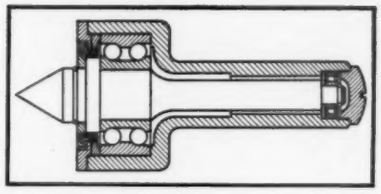
A 1 hp., 1,800 r.p.m. motor is direct connected to the rear drum shaft by means of a flexible coupling. This motor is mounted in a vertical position at the top of the machine column. Net weight is about 1,500 lb. and floor space required is 35 x 96½ in.



G. E. Vibration-Velocity Meters

Improved models of vibration-velocity measuring instruments have been developed by General Electric Co., Schenectady, N. Y. The detector unit of these meters is a small electrical generator operating on a reciprocating motion. A small coil inside the unit is attached to the end of a projecting contactor rod. When the contactor rod is held against a vibrating object, an internal coil moves back and forth with the vibration.

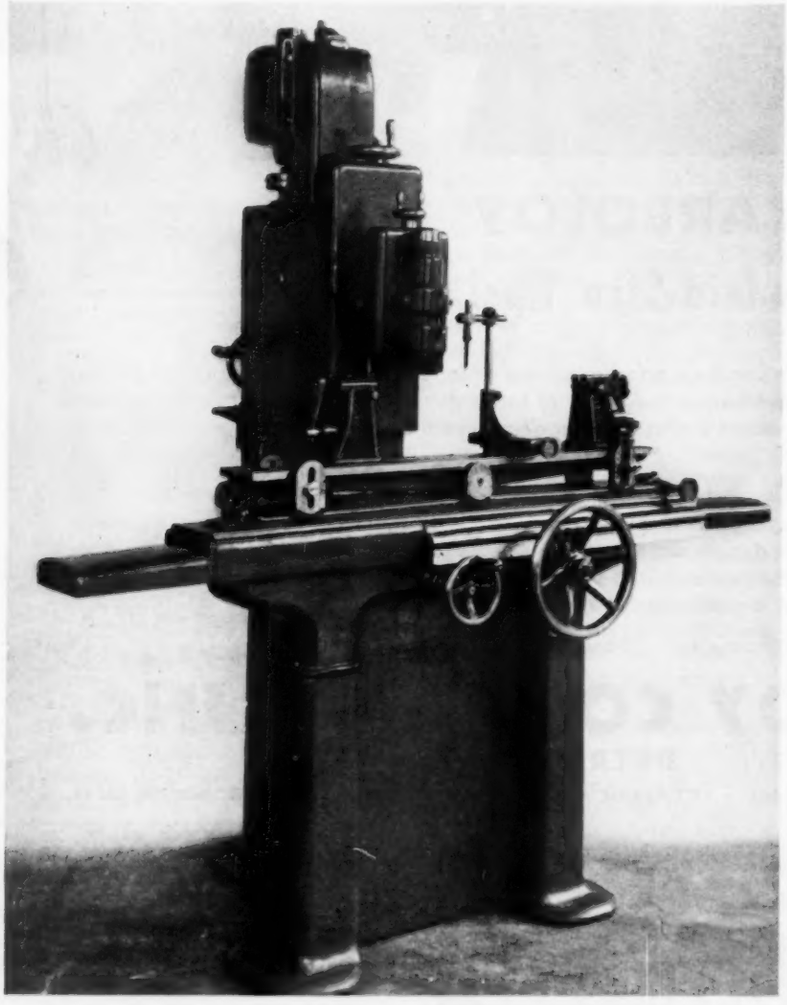
This coil is arranged to move within a strong magnetic field set up by the Alnico permanent magnets. A special mechanical coupling spring between the moving-coil system and the magnetic field structure minimizes the transmission of any vibratory motion to the magnets or to the casing to which they are attached. The interaction between the moving coil and the stationary magnetic field generates a voltage proportional to the rate of motion of the coil, which is the velocity of the vibration. An amplifier unit increases this generated signal to the point where it will operate a small indicating instrument.



"Red-E" Live-Spindle Ball-Bearing Center

A live-spindle type, ball-bearing center, using a double-row preloaded angular contact precision bearing in the front end and a single-row, self-aligning roller bearing in the back, is announced by The Ready Tool Co., State St., Bridgeport, Conn. The double-row bearing in the front is claimed to give rigidity, both radial and axial, and the roller bearing in the back acts as a stabilizer. Spindle is of large diameter to prevent deflection at the center point.

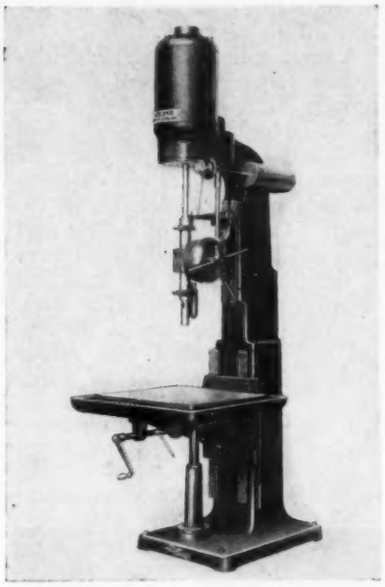
A labyrinth seal is provided to eliminate any dirt, chips or cutting compound from getting into the bearing. It also prevents leakage of lubricant from the bearing.



Edlund Drills

A line of drilling machines having the motor mounted on the spindle has been announced by Edlund Machinery Co., Inc., Cortland, N. Y., These machines are available with 8, 12 and 15 in. overhang and with from one to eight spindles. They may be equipped with ball-bearing back gears, semi-automatic power feeds, reversing motor and controls for tapping, and coolant pump, tank and piping.

When the machine is to be used for drilling only, speeds may be 600, 900, 1,200 and 1,800 r.p.m. or 600, 1,200, 1,800 and 3,600 r.p.m. When



supplied with reversing motors the speeds are 600, 900, 1,200 and 1,800 r.p.m. Speeds are selected by turning a knob at the front of the machine and are indicated on a dial. On multiple spindle machines, each motor may be stopped with a drum control or the entire machine may be stopped by means of a foot control. Overload and no-voltage protection are provided.

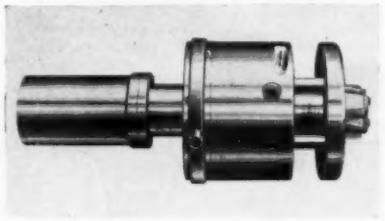
Landis No. 3ALM Collapsible Tap

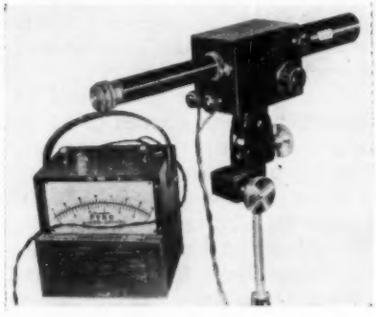
The No. 3ALM receding-chaser collapsible tap announced by Landis Machine Co., Inc., Waynesboro, Pa., is made of high carbon steel and all parts are heat-treated and precision ground. This tap, designed primarily for tapping couplings, may be applied to any machine employing a live spindle where resetting can be done automatically. There is no manually operated model. The internal mechanism is similar to the standard Type IM tap in that it employs a cross-slide cam to control the taper. It is possible to trip the tap at any position by merely adjusting a tripping bar so that it contacts the tripping button located in the body of the tap near the shank end.

A simple adjustment is provided for taper change and for taper correction. This tap may be used for any taper of thread ranging from O, or straight threads, to $\frac{3}{4}$ in. taper per ft. and may be changed by small degrees. It is merely necessary to release a locking screw in the control collar and move the taper indicator to adjust for any error or change the taper.

Cutting coolant is admitted to the tap through a bronze yoke ring located at the rear of the control collar. From here the coolant is fed into the hollow tripping ring through the tripping ring supports, which also are hollow. The faceplate of the tripping ring is perforated with a series of small holes, so located that the entire volume of coolant is directed within the coupling.

Range of this tap is from 2 to 4 in. inclusive and the same tap heads may be employed as are used on the standard Type 4LM receding chaser tap. This tap is fully inclosed, eliminating the possibility of chips or dirt entering to cause wear.





Pyro "Micro-Optical" Precision Pyrometer

Designed for measuring the temperatures of very small objects, the "Micro-Optical" pyrometer, announced by The Pyrometer Instrument Co., 102 Lafayette St., New York, N. Y., provides a twenty-fold magnification of the object. To obtain the best results, this instrument is used with a rigid support, the holder being equipped with a precision worm-gear arrangement for accurate adjustment in any desired direction so as to focus the instrument steadily on any given spot.

A precision ammeter, with built-in battery, is attached to this instrument, which operates on the principle of a disappearing filament and is furnished with three scale ranges. An objective of 37 mm. aperture produces a reversed image of the object which is viewed through the ocular which acts as a microscope.

Shakeproof Thread-Cutting Screw

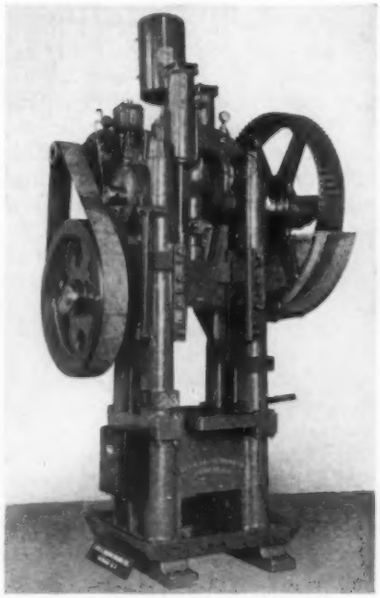
Designed to cut its own thread in metals and plastics of practically any thickness, the thread-cutting screw announced by Shakeproof Lock Washer Co., 2501 North Keeler Ave., Chicago, Ill., has standard machine-screw threads. A special hardening process, together with a thread-cutting slot, eliminates any separate tapping operation normally required in the use of standard machine screws. Another advantage claimed for this screw is that, should it ever be necessary to replace the screw, an ordinary machine screw of the same size will fit its thread.

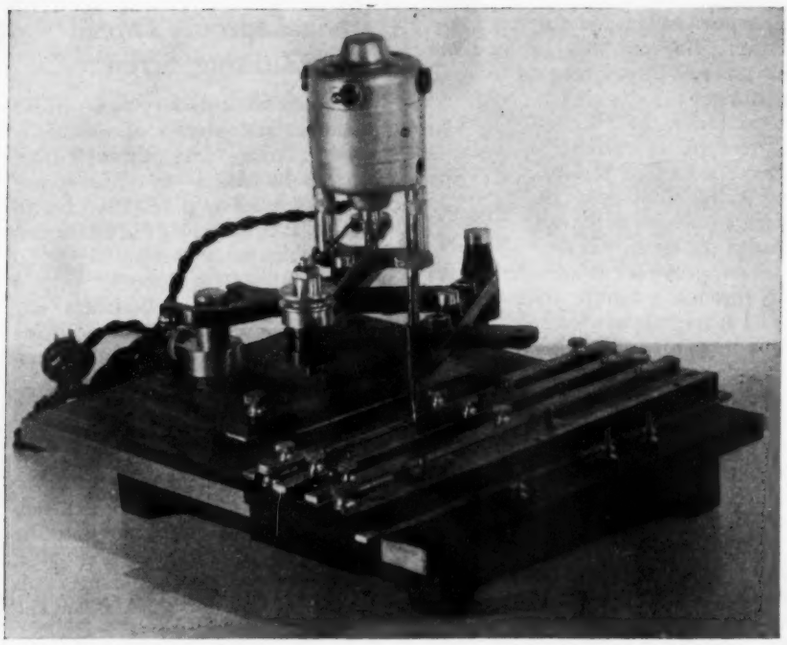
Material removed in the thread-cutting operation is directed into the slot, away from the cutting edge, thus eliminating the danger of clogging and insuring a clean cut.

Z. & H. 75-Ton Straight-Side Press

A straight-side press of built-up tie-rod construction and having a capacity of 75 tons has been announced by Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J. This single-crank press has a maximum stroke of 12 in., and a bed area, front to back and right to left, of 20x19 in. It is equipped with balancing cylinders for the slide, force-feed lubrication, roller bearings and individual motor drive.

Net weight, including motor drive, is 11,000 lb. Over-all floor space required is 59x53 in. and rated speed is 50 strokes per min.





"Mico" Pantograph Table-Top Engraver

Cutter spindle of this table-top engraver, announced by Mico Instrument Co., 10 Arrow St., Cambridge, Mass., is carried on pre-loaded ball bearings to give rigidity to the cutter and permit operation at 8,000 to 12,000 r.p.m. Cutter is held in the spindle by a drawbar and accurately centered by means of a short taper. The motor, weighing 1½ lb. is mounted on the extension of one arm of the pantograph and is belted to the cutter spindle with a short, endless belt.

Among the features claimed for this machine is that the copy and the work are in sight at all times and are right-side up. Assembly of the master copy is easy and corrections and changes can be made rapidly. The pantograph is a three-dimensional type so that the tool is lifted from the work when the tracing point is taken out of a letter. This is claimed to eliminate spoiled work through forgetting to lift the tool from the work before lifting the tracer from the copy.

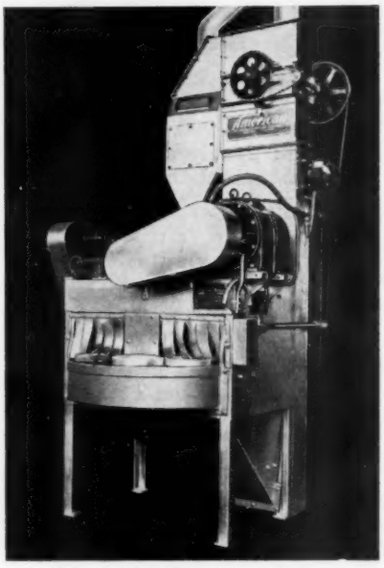
Four reduction ratios are provided, giving letters two-thirds, one-half, one-third and one-quarter the size of the copy. Ratios are changed by removing and replacing two shouldered screws in the pantograph network. These four ratios result in letters ¼, $\frac{3}{16}$, ⅛ and $\frac{3}{32}$-in. tall when standard ⅜-in. copy is used. Other alphabets are available so that letters smaller and larger than these are possible. Line spacing is changed by loosening two clamp screws and moving the copy carrier. Depth of cut and width of engraved letters are controlled by the knurled-head screw of the tracer point.

Work is held flat on the bed by simple clamps and a series of 10/32 holes, spaced on 1 x 1 in. centers, provides for locating a wide variety of shapes and sizes of work. Work as thick as 2 in. can be successfully handled with making special adapters. Work table is 9½ in. wide. Maximum clearance between copy carrier and pivot stud is 7 in. It is possible to write over most of this area, but not with all reduction ratios. Three lines of 30 characters each can be assembled on the copy carrier. Master copy is laid in shallow grooves and clamped in place by bars which are easily installed and removed.

AFE Wheelabrator "Tablast" Cleaner

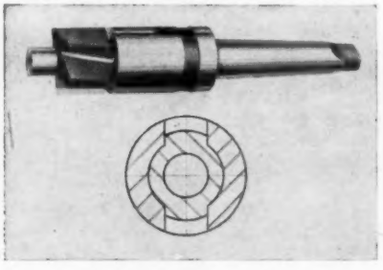
Tables for the small Wheelabrator "Tablast" cleaner, offered by The American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind., can be furnished in sizes ranging from 5½ to 16 in. diameter. Any work under these size limits can be cleaned quickly. The unit consists of a number of independent tables which are mounted on a spider that carries them directly under the blast zone. A motor-driven steel disk contacts the tables, rotating them eight times to each foot of travel. The Wheelabrator unit throws abrasive by centrifugal force and the abrasive cycle is fully automatic.

A speed reducer on the table drive permits varying the speed of work through the blasting area from 120 to 420 tables per hour. Any desired finish may be obtained by using the proper size shot or grit and adjusting the table speed for correct blast exposure. Cabinet is of heavy steel plate and the front half is cut away so that the operator can load and unload outside of the blast area. Opening across the front of the cabinet is heavily baffled with rubber curtains to prevent loss of flying abrasive. The complete "Tablast" unit weighs approximately 3,500 lb., requires 5 sq. ft. of floor space and stands 123 in. high.



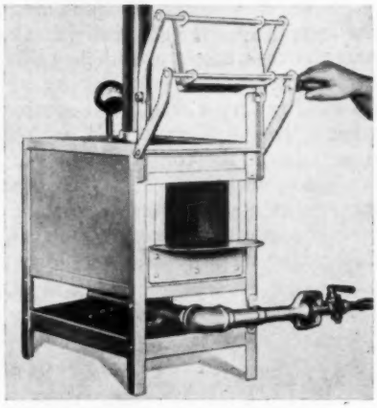
National Spline-Taper Counterbore Tools

Heavy-duty, spline-taper drive counterbores and spline-drive inverted spotfacers have been announced by the National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich. Taper shank and socket construction is claimed to provide permanent alignment and rigidity in these interchangeable counterboring tools. Rea-



sonable wear on tool shank or holder socket does not result in looseness or misalignment. All cutters of the same diameter, as well as all other sizes in a given series or range, will fit interchangeably in the holder designated for that range.

Spline-drive inverted spotfacers are said to combine features of sturdiness, positive driving and accurate alignment with long life and easy assembly. The hardened and ground alloy steel pilot fits snugly in the cutter, while driving is accomplished through splines that are part of the pilot. These splines bear against slots in the cutter, giving an equalized right-angle drive. Cutter is retained by solid shoulders on the pilot, yet it is only necessary to turn the cutter backwards on the pilot a small distance, then slide it off.



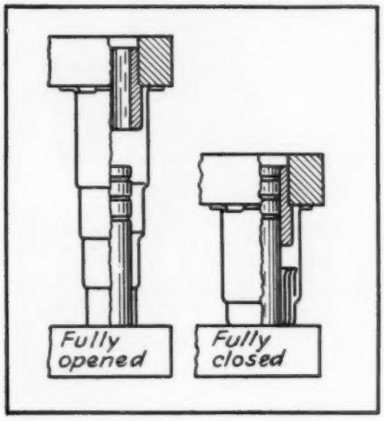
Baker Toolroom Annealing Furnace

This toolroom furnace, offered by Baker & Co., Murray & Austin Sts., Newark, N. J., has a temperature range to 2,000 F. without using blower or compressed air. All walls have refractory insulation over 3 in. thick. It is claimed that a hand can be placed on the outside casing when the automatic door is closed. The cast chrome-nickel floor is claimed to be sagless and long lived. Temperature is controlled by a stop-cock on the heat manifold.

Specifications: Oven No. 1: heating chamber 6x8 in.; height of heating chamber, 6 in.; height to base of stack, 21 in.; width, 14 in.; depth, 15 in. Oven No. 2: heating chamber, 6x12 in.; height of heating chamber, 6 in. Oven No. 3: heating chamber, 8x8 in.; height of heating chamber, 6 in. The No. 1 unit has a 5-in. door opening, while the other two units have full-size door openings as shown.

Wiesman Leader-Pin Protective Covers

Designed with a telescopic action, which eliminates any open space between the pin and the female die, these leader-pin covers offered by The Wiesman Mfg. Co., Fourth and St. Clair Sts., Dayton, Ohio, both serve to eliminate personal accidents and to keep chips and dirt away from the pin and bushing. These covers are made in single, two, three and four units. The units can be furnished in any length from 1½ in. up, and in combinations to cover pins on long stroke presses. Lengths can be increased by half inches. Top units are used singly when only the opening between the pin and bushing is to be covered. To cover the pin fully, the top unit and a number of reducing units are used. These reducing units telescope with each other and with the top units.



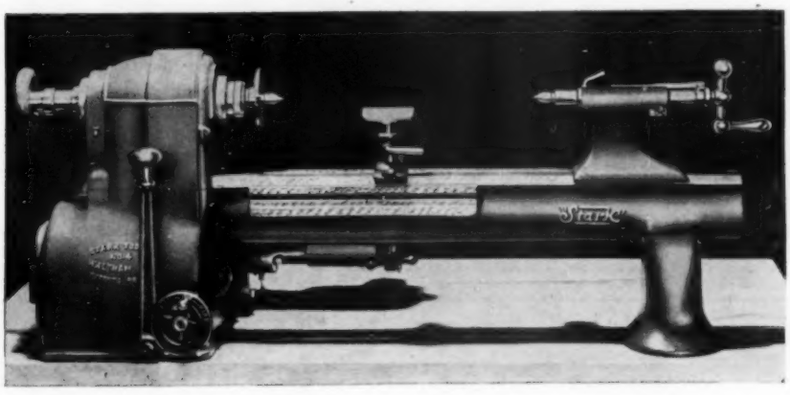
Stuart "Kleen-Kut" Soluble Cutting Oil

An improved "Kleen-Kut" soluble cutting oil, claimed to give higher tool life and to have greater anti-rust value, is announced by D. A. Stuart & Co., 2733 South Troy St., Chicago, Ill. Composed mainly of petroleum derivatives and of raw materials of high quality, this cutting oil is said to mix easily and quickly with moderately hard water at normal temperatures.

Stark Integral-Drive Precision Bench Lathe

The integral-drive precision bench lathe announced by Stark Tool Co., 218½ Moody St., Waltham, Mass., is a compact unit which requires nothing but electrical connection before use. It may be mounted on any bench without cutting the bench or fastening the lathe in any way, making it possible to use the lathe as a portable unit if necessary. Drive consists of a ½-hp. geared-motor driving through a disk clutch and variable V-belt sheaves to the head stock. Any speed between 156 and 2,200 r.p.m. can be obtained in the standard model or between 260 and 3,500 r.p.m. in the high-speed model. Speeds are registered on an indicator mounted on the switch column.

Both integral drive models are built in No. 4 and No. 4½ sizes, having 9-in. swing and 40-in. length of bed. The No. 4 unit has a ¾-in. maximum collet capacity through the spindle, while the No. 4½ unit has 1-in. collet capacity. Both units use standard collets in decimal or fractional bores up to maximum capacity. Bed casting is one piece with the drive housing and ways are of standard dimensions, so that attachments for the cone-head lathes of the same size are interchangeable. All of the standard No. 4 and 4½ Stark at-



tachments, except the milling attachment, may be used. These includ- lever chuck-closer, cutting off and forming rests and automatic turret head, together with several types of tailstocks, face plates, chucks and collets. Internal or external grinding attachments are also available. Net weight of both models, with regular equipment is 310 lb.

Kux-Lohner Model BH Hydraulic Die-Caster

Arranged as completely self-contained units that require no air compressor, except when used for aluminum castings, the Model BH hydraulic die casting machines announced by Kux-Lohner Machine Co., 2145-47 Lexington St., are suitable for casting lead, zinc, or aluminum-base alloys. For zinc and lead, these units are ready to operate after gas, water and electrical connections are made. The adjustable core pulling mechanism, which can be placed at any required position around the dies, is claimed to be completely universal. It will pull cores at any angle and at any position on the die and also can be said to pull any length of core from zero to the maximum length desired. This mechanism can be set to pull cores in either the stationary half or the movable half of the die.

Design is such that no strain is put on the furnace and the metal pot. A heavy bridge construction supports the plunger gooseneck, which is easily adjustable for good nozzle contact with the die. The hydraulic ram which operates the plunger is placed on the side of the machine, instead of above the pot, to keep it away from the heat. Design of plunger has been improved to permit adjustment for wear and is claimed to be non-sticking.

"Abrasaw" No. 48 Wet Cut-Off Machine

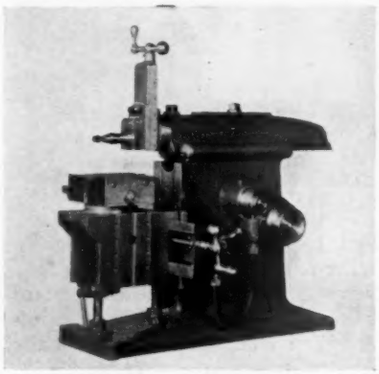
Similar in general design to the No. 48 "Abrasaw" dry-cutting cut-off machine, the wet cut-off machine offered by The Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn., has a coolant tank mounted on the side of the machine. This tank is equipped with a suitable pump and piping for supplying cutting lubricant to both sides of the cutting disk. Vise is arranged so that it will take a movement of $\frac{1}{4}$ to $\frac{3}{8}$ in. of the vise jaw to clamp the work. This is necessary so that there will be enough movement of the foot pedal to operate the water valve.

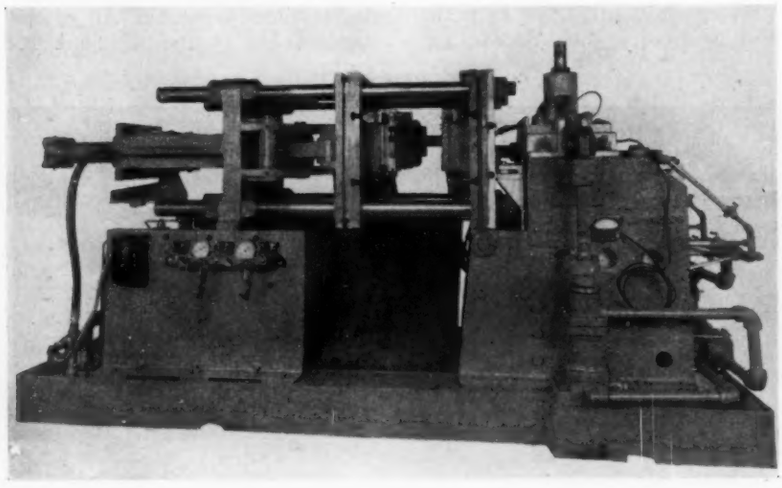
Specifications: Capacity up to $2\frac{1}{2}$ in. diameter; capacity with special vise for light sections, $3\frac{1}{2}$ in. diameter; motor required, $7\frac{1}{2}$ hp.; speed of motor, 3,600 r.p.m.; size of disk, 12 in. diameter; thickness of disk, 3/32 in.; spindle speed, 5,000 r.p.m.; floor space required, 36x40 in.; height of machine, 59 in.; height from floor to top of table, $37\frac{1}{2}$ in.; weight, 1,020 lb.

Ammco 6-in. Shaper

Available mounted on a portable work bench that can be rolled from job to job, or for mounting on a standard bench, the 6-in. crank-type shaper offered by Automotive Maintenance Machinery Co., 2100 Commonwealth Ave., North Chicago, Ill., is equipped with a three-step cone pulley which gives three speeds to the ram. Automatic cross feed to the table has four variations of feed. Vise is graduated for angular work and the tool head is likewise graduated from 0 to 90 deg. for dovetail and similar work.

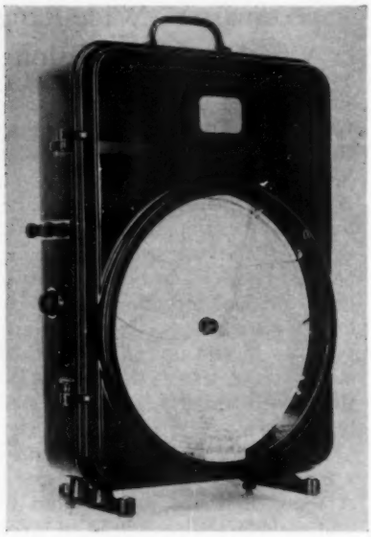
Stroke is adjusted by loosening the locknut on the end of the shank near the feed eccentric and then adjusting the rocker arm block up or down. The proper amount of adjustment is indicated on a scale, which shows the stroke for each position. No adjustment is required between the ratchet and the eccentric of the feed mechanism when the table is lowered or raised.





M. & W. Plating-Rack Insulating Enamel

Developed for insulating all but the contact points of racks used in chrome plating, chrome rack enamel, announced by Maas & Waldstein, 438 Riverside Ave., Newark, N. J., is supplied in two colors, red and black. This enamel is applied by dipping the racks, with the contact points protected by tape, into the enamel. Three or four coats are required, which can be applied at intervals of about two hours. After the final application, the coating becomes hard enough for use if forced-dried for two hours at 150 F., or it will air dry in 24 hours.



Bristol "Pyromaster" Portable Pyrometer

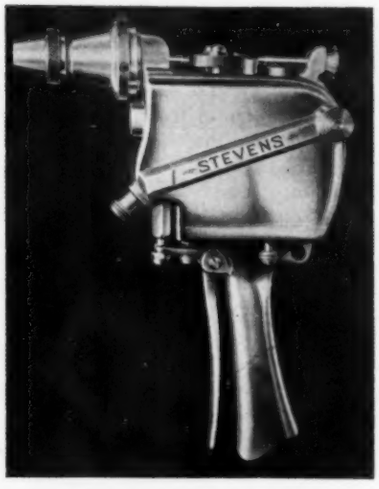
It is claimed that the "Pyromaster" portable pyrometer, announced by the Bristol Co., S. Main St., Waterbury, Conn., does not require careful leveling while in use. The instrument is not affected by vibration and there are no continuously moving parts or trains of gears to engage or release in order to position the pen on the chart. When an unbalanced condition in the potentiometer circuit occurs, a series of relay-actuated switches operate a motor to position the slide wire contact on which the pen arm is mechanically connected.

Using standard thermocouples, these portable instruments are available as pyrometers for ranges from 0 to 500 up to 0 to 3,000 F. They are also available as resistance thermometers, for ranges from 20 to 350 F. Provision is made on the case for suitable plugging devices to connect these instruments to the thermocouple or resistance bulb and to a source of 110 or 220 volt a.c. power. Chart is 12 in. in diameter and rotation is by Telechron clock.

Stevens Model OZ-3 Metal Spray Gun

A gear shift is an integral part of the assembly of the model OZ-3 metal spray gun offered by Stevens Metal Spraying, Inc., 83 Shipley St., San Francisco, Calif. High speeds are available for spraying the lower melting-point metals, such as tin, lead, cadmium and zinc. Low speeds are suitable for spraying aluminum, brass, copper, bronze and various grades of steel, using $\frac{1}{8}$-in. diameter wire. High-speed reduction is 800 to 1, while the low-speed reduction is 1,600 to 1. This reduction is obtained by moving a pin which actuates a sliding yolk on the reduction gear shaft. No change of gears is necessary.

Wire tension device is controlled automatically by the movement of the gas control lever. Setting-up and releasing tension is in synchronism with the ignition of combustible gases at the nozzle tip. The entire mechanical assembly is removable from the gun body for inspection. High-capacity type nozzle is of two-piece construction, having positive tapered seats. Wire-guide section of nozzle is of tempered tool steel.



Quigley "Insulag" Refractory Lagging

"Insulag," a refractory lagging designed for use on high-temperature equipment, has been placed on the market by Quigley Co., Inc., 56 W. 45th St., New York, N. Y. It may be applied on hot surfaces of flues, ducts, or drums; also on refractory brick and concrete, and may be used as a finishing coat for other insulation. It is claimed that "Insulag" does not shrink when drying, but actually increases in thickness after application and retains this increased volume throughout its entire range of service temperatures.

It has low healt-storage and low thermal-conductivity properties, which permit reduction in thickness of heavy fire-brick walls. Crushing strength, when thoroughly dried, is in excess of 150 lb. per sq. in. It is recommended for interface temperatures up to 2,200 F., or directly exposed to 2,000 F.

Skybryte "Snopake"

"Snopake", a pale-green adhesive liquid that can either be brushed or sprayed on windows, is offered by The Skybryte Co., 1919 E. 19th St., Cleveland, Ohio, to reduce the excessive glare that is experienced during the winter months in buildings adjacent to open fields where large expanses of snow are present. It is claimed that windows treated with this material admit more than 90 per cent of the light, yet reduce it to a mellow softly-diffused illumination. It is applied to the inside or outside of the window and remains on the glass until removed with hot water and a stiff bristle brush.

Pyro-Universal Hardness Tester

Model H direct-reading universal hardness testing machine, announced by The Pyro-Electric Instrument Co., 6659 Chase Road, Dearborn, Mich., is calibrated for $\frac{1}{16}$- and $\frac{1}{8}$-in. and 5-mm. balls, as well as for the standard penetrator diamond. Load is applied by a hand-operated crank, which is conveniently located.

The standard machine has a vertical capacity of 8 in.; with load capacities of 60, 100 and 150 kg. Retaining lugs permit the machine to be secured to the work table, precluding damage to the machine from tilting. Dial arrangement permits *A*, *B*, and *C* scale readings with but one set of black numerals.

Throat depth is 7 in. and approximate weight is 250 lb. Overall dimensions are $29\frac{1}{2}$ x $22\frac{1}{4}$ x $8\frac{1}{4}$ in. Power-operated models are also available.

Automatic "Gasfluxer"

Brazing flux is automatically dispensed by the "Gasfluxer" developed by the Automatic Gasflux Co., 620 Frankfort Ave., Cleveland, O. The gas, passing through this unit, is mixed with a special flux. Flux travels with the gas to the torch tip and is expelled in the flame. This flux has a very low melting point and creeps ahead of and is always under the brazing puddle.

Accurately controlled, automatic fluxing is said to form a joint free from the deposit ordinarily left on the weld when a dry flux is used. This eliminates the need for a pickling operation and little grinding is necessary to clean up the weld. No special equipment is required, as the Gasfluxer can be used with all types of equipment as well as any standard gas. No changes are required in torches, tips or regulators.

"Amercoat" Corrosion-Resistant Material

Dilute solutions of acid, caustics, gasoline, oils, greases, hydrogen sulphite gas and other corrosive agencies are claimed to have no apparent effect on "Amercoat" corrosion-resistant plastic material. Offered by American Concrete & Steel Pipe Co., Box 1428, Arcade Station, Los Angeles, Calif., the material is suitable for a temperature range of from minus 50 to plus 150 F. In addition to its inertness to corrosive agencies, this material is claimed to bond to the base material, whether it be concrete, steel or wood.

Amercoat may be sprayed on with paint-spray apparatus and it is normally applied with a thickness of 1/64 in. Naturally colorless, this material may be pigmentized to blend with its surroundings, thus serving as an ornamental covering as well as a corrosive-resistant protection. The protective covering is made up of three separate solutions, comprising a prime coat, an enamel and a seal coat.

"Rockwell" Improved Hardness Testers

Wilson Mechanical Instrument Co., Inc., 383 Concord Ave., New York, N. Y., announces improvements in the "Rockwell" hardness tester to permit precision testing in dusty atmospheres. Models may be obtained in all sizes with a hinged cowl, shielding the testing head from grit and dust in heat-treating rooms. The cowl lifts on trunnions, so that the head mechanism is completely exposed for inspection and adjustments. Sealed ball-bearings have been placed in the head to facilitate smoothness of operation.

An improved valve system in the oil-dash-pot insures the effectiveness of the speed adjustment, even at the beginning of the stroke. Changes in the depth measuring system have resulted in a higher order of precision in making close determinations. The work support for ¼-in. diameter or larger round rod and other cylindrical shapes has been changed from a V-notch to two adjacent hardened and ground cylinders which will accommodate a greater range of diameters and give hard and true anvil support for such parts.

"Speedmaster" Wide-Range Variable Transmission

Employing standard V-belts which run over adjustable bakelite pulleys, this transmission unit, announced by Speedmaster Co., 1301 Washington Ave. South, Minneapolis, Minn., automatically maintains alignment between the pulleys and the belt. Standard makes of belts are adaptable in this transmission, making belt replacements simple and inexpensive. In the unit illustrated, the output shaft runs at 90 r.p.m. at the slow speed and at 4,300 r.p.m. at the high speed.

Handwheel on the cabinet controls a toggle lever for changing speeds. A speed indicator is built into the unit and the dial is placed in a convenient position for easy reading. Output shafts may be coupled directly to the driven unit, or a V-belt may be used on the pulley shown in position on the output shaft.

Pettinos "Sonittep" Insulation Cement

Claimed to be particularly suitable for annealing, forge and electric furnace insulation, "Sonittep" insulation cement offered by George F. Pettinos, Inc., 1206 Locust St., Philadelphia, Pa., can be applied by unskilled labor. It is available ready for mixing and immediate application to hot or cold surfaces without the use of bands, wire or other reinforcement. If it is not heated over 1,400 F., it is reclaimable to be used again. It is suitable for temperatures up to 2,000 F. and is claimed to check air infiltration. It will not shrink or crack.

A-B Pushbutton Control Stations

Designed to supplement the line of heavyduty pushbutton control stations, the Bulletin 800 stations offered by the Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis., are available in surface- and flush-mounting types. These units have a maximum d.c. rating of 2.5 amp., 115 volts; 1.25 amp., 230 volts; 0.25 amp., 550 volts. Maximum a.c. rating is 10 amp., 110-220-440-550 volts.

Mechanism is of unit type construction and can be mounted in combinations of one to ten buttons. These units have a set of normally open and a set of normally closed double-break, silver-alloy contacts. Two- and three-way selector switches and pilot lights are interchangeable with the pushbuttons.

Lincoln "Transweld" Welding Electrodes

The Lincoln Electric Co., Cleveland, O., offers "Transweld" electrodes for use with small a.c. transformer-type arc welders. These electrodes are of mild steel and have a heavy extruded coating. It is claimed that they have a stable arc.

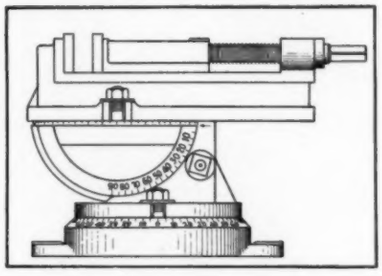
"Transweld" is said to be suitable for making all types of welds in flat, horizontal, vertical or overhead positions. The electrode operates equally well with d.c. of either straight or reversed polarity. Tensile strength is 75,000 to 85,000 lb. per sq. in., yield point is 60,000 to 68,000 lb. per sq. in., and ductility is 20 to 30 per cent elongation in two inches.

Rods $\frac{3}{32}$, $\frac{1}{8}$ and $\frac{5}{32}$ in. in diameter are available. The smaller size is furnished in 12-in. lengths, the other two in 14-in. lengths.

Trico "Sentinel" Automatic Oilers

"Sentinel" constant-level oilers, announced by Trico Fuse Mfg. Co., Milwaukee, Wis., are designed for automatically maintaining an accurate level of oil in ring and ball bearings of motors, line shafts, pumps and other equipment having oil wells. As oil is used up in the bearing chamber, it is replenished with fresh oil from the reservoir.

No attention is required after the unit is installed, except to fill the reservoir periodically. The clear glass reservoir is screwed into the solid-bronze, cadmium-plated fitting and can be removed for refilling. Four sizes are available.



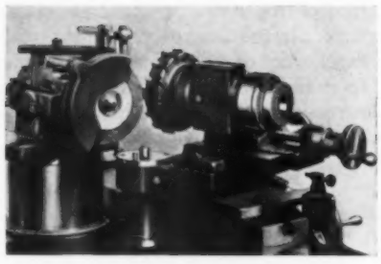
Master Universal "Multi-Swivel" Vise

Suitable for use on drill presses, milling machines, shapers, planers or surface grinders, the "Multi-Swivel" universal vise announced by Master Tool Co., 137 Oliver St., Boston, Mass., can be swiveled in three directions. Work, once set up in this vise, need not be disturbed, as the vise and work can be transferred as a unit from one machine to the next.

Specifications: over-all length, $17\frac{5}{8}$ in.; over-all height, $11\frac{1}{2}$ in.; maximum jaw opening, with steel plates in place, 4 in.; maximum jaw opening without steel plates, 5 in.

Cincinnati Radius Grinding Attachment

This radius grinding attachment, offered by the Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati, O., is designed for use with the No. 2 cutter and tool grinder. Attachment consists of four principal parts—the swivel housing, which is fastened to the machine table, the swivel table, top plate and the work-head support. The work-head, draw-in bolt and collets are



part of the regular machine equipment.

Adjustment of the cutter to the correct radius is obtained by means of two handwheel-operated screws located at right angles to each other. A setting gage, shown in the right foreground, fixes the zero position of the cutter. By moving both adjusting screws the same amount, the attachment is set for grinding a radius which will exactly match the face and periphery of the cutter. Face, radius and periphery of the cutter can be ground without removing the cutter from the attachment. Maximum capacity is 12-in. cutter diameter and 1-in. radius. Net weight of attachment is 145 lbs.

American "Vibrometer"

Amplitude of vibration of structural or machine members can be measured with the Vibrometer offered by American Instrument Co., Inc., 8010-8020 Georgia Ave., Silver Spring, Md. Range of this instrument is from 0.001 to 0.030 in. amplitude. It is said to be constructed in such a manner that no damage can result when it is applied to a vibrating member having an amplitude greater than 0.030 in.

This instrument is designed to be held in the hand with the spindle point held against the vibrating part whose amplitude is to be measured. Motion of the spindle is transmitted directly to the bright yellow pointer, which appears double to the eye of the observer. The apparent intersec-

tion of the two images, read on the scale on the background, gives the amplitude of vibrations directly in thousandths of an inch. Instrument is made heavy to avoid inertia effects during use. Weight is 2 lb.

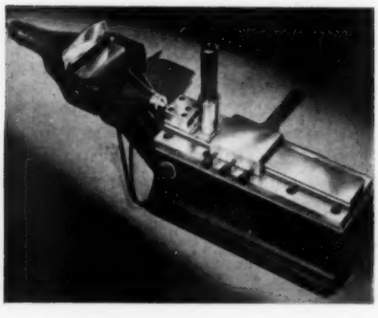
Sullivan "Frosto" Freeze Preventive

Designed to supplement the "Tanner Gas" system of preventing freezing in air lines and pneumatic tools, "Frosto" is offered by Sullivan Machinery Co., Michigan City, Ind., for industrial applications where electric current is available for its operation. "Frosto" is vaporized in a special vaporizing unit and is fed into the compressed air line near the compressor. Feed is as rapid as is necessary. It is claimed that this system is effective and that current consumption is small. It is thermostatically controlled and it is said that only a quart of "Frosto" is required to treat 100,000 cu. ft. of free air under bad conditions of temperature and humidity.

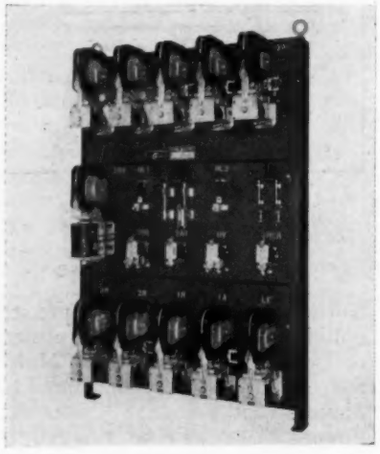
Sheffield Taper Inspection Gage

A visual-type checking device, announced by the Sheffield Gage Corp., Dayton, Ohio, is claimed to eliminate the human factor in checking tapered plug gages. This instrument is used to check the small diameter of the taper. On one end of a plain, horizontal bed is an adjustable anvil, at the other a visual gage head. This head incorporates the Sheffield reed mechanism which avoids the use of gears, levers, knife edges or any element which operates under sliding contact.

In checking the small diameter of a tapered gage in this device, precision gage blocks equivalent to the true diameter of the small end of the taper are stacked on the horizontal bed between the adjustable anvil and the gaging element. A standard gage roll is then placed tangent to each end of this stack and the adjustable anvil moved so as to bring the blocks and rolls into contact with the gaging element. The actual small diameter of the gage is read directly by substituting it for the stack of blocks.



Value of the taper angle of the plug is determined by using a standard visual gage in conjunction with a master wedge-shaped block. This block as a fixture to hold the tapered plug on the anvil of the visual gage. The angle between the base and the hypotenuse of the wedge is equal to the entire included angle of the taper. Thus with the tapered plug lying along this hypotenuse, its upper side will be horizontal if its dimensions are correct. These master angle blocks are available for all standard tapers. Blocks can be provided for any special taper.



G. E. Crane-Hoist Lowering Control

Making use of rocker-bearing contactors and magnetic-time relays that have proved satisfactory in steel-mill service, this d.c. crane-hoist control announced by General Electric Co., Schenectady, N. Y., features high lowering speeds and maximum safety for the operating crew. Other features are good speed regulation, precise spotting of the hook and ample protection of both motor and brake from abuse.

Regenerative braking is obtained for any load requiring 30 per cent or greater braking effort. Dynamic braking is also available for emergency stops in case of solenoid brake failure. Automatic control of deceleration by a magnetic-time relay provides safe stopping of loads when lowering.

Bruce Improved Buffing Compositions

Bruce Products Corp., 5712 Twelfth St., Detroit, Mich., has developed an improved method for the preparation of buffing compositions. This method mixes, shreds, vacuumizes or de-airs, cools and forms the bar in one continuous operation. It is claimed to give an entirely new structure to the bar, eliminating former restrictions. New compositions are claimed to have uniform and improved density of structure. These products are marketed under the trade names "Tri-Vac," a buffing composition for base metals; "Li-Vac," a composition for buffing plated metals; and "Lub-Vas," a polishing wheel lubricant.

Holden High-Speed Hardening Baths

It is claimed that molybdenum steels can be successfully hardened in a process developed by A. F. Holden Co., New Haven, Conn. By this method, the highspeed steel tools are excluded from any atmospheric attack by being processed through the baths from the time of immersion until below scaling temperature by a film of salt on the outside of the tool. The method includes a pre-heat at 1,600 F., hardening at from 2,170 to 2,350 F., depending on the type of high-speed steel. First quench is at 1,350 to 1,450 F. and second quench is from 700 to 800 F. The object of this quench from the high temperature is to remove the high-speed bath from the tool and to quench to a low temperature where no scale can occur.

The pre-heat bath is so designed that when tools are transferred to the high temperature for hardening, this bath is completely volatilized from the high-speed tools so that no contamination of the high temperature bath occurs. Holden High Speed 17-25 is used at the high temperatures in a ceramic pot, which eliminates the possibility of iron contamination of the bath so that no decarburizing or loss in size will occur, other than dimensional change expected in the high-speed steel from the high temperature hardening. The ceramic pot was developed for this process and can be used from 1,500 to 2,400 F. with special baths. This pot reduces the consumption of the bath, producing economical pot life both in an electrode type furnace or in a fuel fired unit.

Prevention of Occupational Disease

It is the total impact of all circumstances of life that raises or lowers our resistance, determines our vitality and leaves us either easier or more difficult prey to ever present health enemies. Therefore, industrial management continually combats all disease in degree as it provides good working conditions. Stated in reverse, industrial management promotes ill health if it provides working conditions that tear men down physically, mentally or emotionally.

New products, new methods, new materials, while advancing the general welfare of all of us, engender new dangers which too frequently become apparent only after they have ruined the lives of a number of men. While we must recognize that this is the inescapable price of social progress we must, at the same time, exert ourselves to the utmost to foresee such dangers whenever possible and remove them as soon as they are detected. Before adopting new practices, new materials or new products, we should consider the welfare of workers under the new conditions at the same time that we study costs and markets.

Defenses against occupational diseases that are known to chemists, engineers and doctors should be adopted as a matter of course. If the net cost of these precautions be too great and their neglect should cause too much human suffering for the compensating good to society, then the occupation itself should be abandoned. Public service, not profit consideration, should determine whether the occupation under study should be pursued or dropped.

There are several factors which directly or indirectly have health implications. First and foremost there is the matter of wages. Consider for a moment, the home life and the indirect "off the job" effect on a man's health of an adequate and regular income as contrasted with the opposite condition. Good wages, under even improper conditions, might bring better health, a longer life and a happier home than a low wage under good health conditions. This is not hard to understand when it is considered that in this land of want we have arbitrarily reduced work to about forty out of each one hundred and sixty-eight hours, when we work at all. Wtih adequate income, the build up of resistance in one hundred and twenty-eight hours may compensate for the tear down during the forty hours. With a meager income, the tear down during the one hundred and twenty-eight hours is likely to out-weight the build up during the forty.

Probably in the majority of cases, a man's most healthful surroundings are at his place of work, not at his place of recreation, not even in his home. Many an illness or accident has been laid on the door step of industry when carelessness, ignorance or even viciousness elsewhere sowed the seed. Men catch colds in crowds or elsewhere, then stand in a draft for a minute at work and complain of an improper place to work.

In rapid order, think of the effect that proper consideration of the following elements of working conditions can have on the health and well being of workmen: proper hours, rest periods, appropriate sanitary and bathing facilities, recreational opportunities, clean heated, cooled and lighted ventilated work space, proper tools, promotional and training en-

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couragement, proper work assignments and quotas, relief from nerve racking noises and odors, protection from fumes and dust and heat and light rays. The ill effect of thoughtless, heartless, ignorant or unfair supervision is more direct and awful, while the effect of workmen contact with the opposite kind of supervision is highly beneficial in every respect.

Placing men with regard to their personal health is a thing that any employer can do effectively, if he knows both the man and the job. To know the man, examinations are necessary. In our plant we have used pre-employment examinations for more than eleven years. During this time there have been about 40,000 examinations and we have had to reject about five per cent of the applicants. This does not mean that such people are unemployable. It means only that we considered it unfair to the man, therefore not good business, for us to offer them the kind of jobs we had.

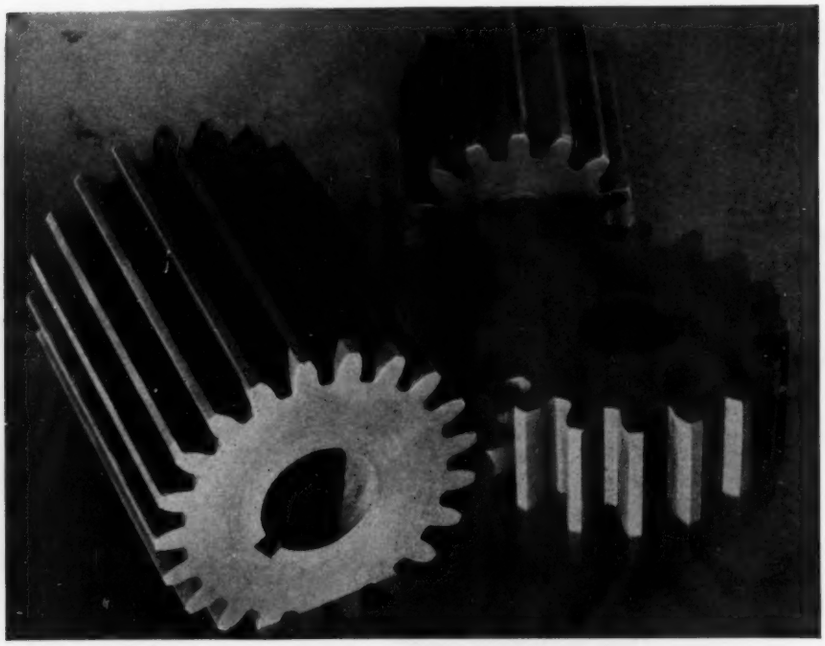
We try in all instances to place a man on a job that is proper for him and decline to consider his application only when our establishment has no work which he should undertake. These men are referred to their family physician, in the hope that they may improve and again apply for work. We also examine men who have been absent from work for seven days because of illness. This is done in order that they may not injure themselves by returning to work before they are physically able to d so. Very recently this examination prevented a man from returning to work too soon after an attack of pneumonia. His family physician had given his consent to his returning, but in the opinion of our doctor a return to work at thai ttme would actually have caused the man's death at an early data.

Silicosis has presented itself very broadly and is one of the few diseases mentioned in the Illinois Occupational Disease Act. Where there are dust hazards, it is necessary to have complete examinations and to eliminate the hazard as far as possible. In our foundry, this examination includes an X-ray film of the chest. If a chest disease exists, or a tendency toward one is revealed, the man is referred to his family doctor. If his condition permits, and there are vacancies, he is placed in other sections of the factory where he cannot injure himself.

In many cases we have found a beginning of tuberculosis which, if it had not been discovered, would have progressed through continued neglect to the point where treatment would have been of no avail. If a foundry employee complains of chest pains or coughs, and an examination indicates that he should not be in his present job, we transfer him to other work. Our job is not completed when a man passes his pre-employment examination and is assigned a task.

With 50,000,000 industrial workers in America and with men, materials, methods and machines constantly changing and with new medical advancements, continuous checking of our disease prevention practices is essention. The first known treatise on occupational disease was written over 1,700 years ago. With all the knowledge of the subject properly recorded at that time, suppose research and improvement had ceased.

Abstracted from address given by B. C. Heacock, president, Caterpillar Tractor Company, and president, Illinois Manufacturers' Association, at a dinner follow-



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ing an Occupational Disease Symposium sponsored by the Medical School of the Northwestern University in Chicago. September 28, 1937.

Back Numbers Available

H. C. Patten, Liberty St., Fall River, Mass., informs us that he has a number of old copies of *American Machinist* editorial matter which are available to anyone who will pay the cost of delivery. If you are interested please write to Mr. Patten or to the editor of *American Machinist*.

Brass-Plating Steel for Rubber Adhesion

To provide a brass-plated surface on steel which will permit good adherence of rubber, the following still solution is recommended by E. I. du Pont de Nemours & Company in the October, 1937, *Modern Metal Finishing:*

Copper cyanide—4 oz./gal.
Zinc cyanide—2 oz./gal.
Sodium cyanide—7 oz./gal.

Where especially strong adhesion is required, a slight increase should be made in the zinc cyanide concentration. For barrel plating, the proportions should be doubled, just as in regular brass plating. Recommended plating time is 10 min.

The brass plating solution should be operated at a temperature of about 80 F., using 70-30 brass anodes and maintaining a cathode current density of approximately 10 amp. per sq.ft. Anode current density should not exceed 300 amp. per sq.ft.

When the solution is made up, the alkalinity must be adjusted with ammonium hydroxide and sodium bisulfite so as to give the deposit the correct color. The ammonia, of course, makes the solution more alkaline; and the sulfite, more acid.

A constant pH is important in obtaining a uniform deposit. The suitable range is 10.3 to 11.7 and this can be maintained by usual colorimetric methods.

Special care should be taken in the rinsing to prevent staining. After plating, the work should be immediately painted with the cement which is used for rubber adhesion. This is to protect the deposit from oxidation, which would otherwise begin immediately and will impair adhesion of the rubber.

Composition of the deposit can be determined only by chemical analysis. Experience indicates that the best rubber adhesion is obtained when the composition of the brass is 70 per cent copper and 30 per cent zinc. Even small changes, such as 3 to 5 per cent, reduce adhesion appreciably.

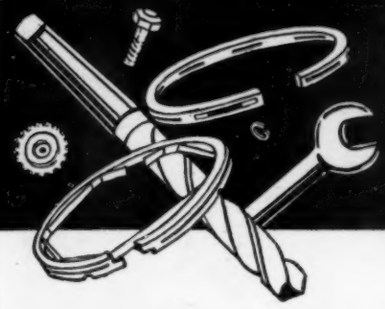
Metal carbonates should not be used in brass plating for rubber adhesion. Large amounts of carbonates simply complicate control of the solution. Any small saving which might appear possible through the use of carbonates is more than offset by poor results and difficulties in control.

Maintenance Machinist

W. R. NEEDHAM
Stafford, England

The article by Gilbert C. Coombs under the above title (*AM*—Vol. 81, page 851) is both interesting and stimulating. The maintenance machinist is in direct line of descent

prevent RUST
THIS SIMPLE LOW COST
OAKITE
WAY



Are you up against rust forming on parts between operations? Or on parts in storage? Are you faced with the problem of so packing twist drills, piston rings, wrenches and similar products that they will reach the user with bright surfaces . . . unmarred by rust?

Then here is good news! Just give parts a quick dip in a solution made up with Oakite Anti-Rust. That's all . . . no fuss, no bother. The light, non-greasy coating of Oakite Anti-Rust positively prevents rust at a cost which is so low that it will surprise you! Arrange to see a demonstration of the simplicity and effectiveness of this Oakite rust prevention method . . . and note the results obtained. The method has been successfully used for years by leading manufacturers.

Let us send you data not only on Oakite Anti-Rust but on other Oakite materials for removing drawing and stamping compounds, burnt-on oil, tallow after tinning, cleaning alloy metals. Interesting booklets gladly mailed free on request.

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SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

from that splendid breed, the millwrights. Today is the day of the specialist and unfortunately most of them are in a very small line of business. Certainly what they spend more and more time upon is without question less and yet less. Despite this almost universal tendency, however, the very extent of the trend brings with it to a few individuals its opportunity of recompense.

The maintenance machinist, as also the garage mechanic, can be reckoned as of the very few fortunates in this respect. There can be no question that whatever the recognized status accorded these men may be, provided they prove to be round pegs in round holes, their value to their employers is exceptionally high. When up against unusual work, where adaptability and initiative are necessary, a man of this type is the one to make good.

Nowadays the expert is often one who has been given from six to twelve months of intensive training in one small direction. His manual efficiency where he received his training is high. He tends to know and to do his bit well. So far as he himself is concerned, the pity is that it is so small a bit. On most men it has a narrowing, restricting influence, so much so that they are afraid of anything outside that bit. The fact that they become so easily satisfied with their narrowed usefulness, and so uneasy outside of it is their tragedy.

The present writer's predilection on the matter of works training is for the smaller shop where the young man must turn his hand to various classes of work. The experience of the big shop may well be left for later years when he has acquired the "knackiness" and the versatility which are really priceless assets. Such an experience is more likely to equip him for the larger scope wherein he serves his employers and himself to far better advantage. He is then well on the highway of engineering and is a worthy successor to worthy engineers.

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Research and Profits

CHARLES F. KETTERING
Vice-president, General Motors Corporation

One great problem in industry that is not understood is the distance between the concept of an idea and putting it on a profit-and-loss basis is getting longer and longer. The gap between the concept of the idea and putting it into production is widening out. Research works during that period.

The reason for this is extremely simple—we are not dealing anymore with the simple order of things. The ordinary, obvious things have been pretty well done. One individual cannot do much anymore. We are doing things by groups—physicists, engineers, chemists and practical men.

When I started in business, I was everything from a draftsman to a superintendent of the factory, but this is not so anymore. Processing and manufacturing have become more and more complicated and standardized. We are in the second order of refinement. Consequently, it takes a longer time to pick up an idea and get it through to a practical conclusion.

If this is not done properly, not understood, it can become what I term "the greatest shirt-losing zone of the industrial world." When we can understand what research is, what

its position in industry is, then industry can move ahead.

Abstracted from an address given at the dedication of Armco's new research laboratories building in Middletown, Ohio, on November 5, 1937.

The "Speed Up"

W. J. CAMERON

The assembly line is an orderly factory transportation system that brings the materials and the work to the man, instead of having him run all over the shop after them. By saving steps, as the housewife saves steps in a well-organized kitchen, the assembly line enables men to produce more and better goods with less waste and so at lower cost. More than any other single method it has given the American family a higher household standard and the American workingman a higher wage than are possible anywhere else on earth. The principle of the assembly line was used 40 years ago in watch-making establishments and in packing houses; since its development by the automobile industry, it has been adopted in manufacturing everywhere.

Now, the "speed up," as commonly and justly denounced, is an abuse of the assembly line. It means the moving line is speeded to a pitch that hurries and strains the men who must keep pace with it. Often where men are on piece-work, they want this. Short-sighted management sometimes uses it to force production. But where it is tried, for whatever reason, it is the depth of inefficiency and defeat its own purpose. Not only does it destroy the atmosphere of steady and competent effort that marks a well-regulated shop, it deprives the job of care and skill and always turns out inferior goods. To say that an employer, intelligent enough to train a permanent working force and build a quality product, would call that good management is like saying a railway company would inaugurate a 90-mile-an-hour passenger schedule with 60-miles-an-hour locomotives. It can't be done.

Occasions arise in every activity when delay or special circumstances may make a spurt of haste seem necessary—you are late for breakfast, you break a shoe-lace at the last minute—or, in the factory, a breakdown occurs, or a sudden emergency demand is made—but continually to run any operation, even breakfast, at a feverish and unnatural tempo, expecting to keep yourself or the operation efficient, is sheer folly. No factory force, no orchestra, no army, no newspaper staff could endure it. If this were enlightened industrial policy, we could not say that 22 per cent of Ford employes have 15 to 30 years of service with us, and that 43.5 per cent are above 40 years of age.

How, then, did industry attain its greater speed of converting raw materials into finished products? How did it curtail the time between mine and market? Certainly not by having men work faster or longer. Faster muscular motion does not permanently save time; driving men to more intense exertion does not permanently increase output; these are accomplished by a simpler arrangement of work and by modern machinery. It is necessary to understand that speeding the work does not mean speeding up the man.

Here are two men operating cranes in the shop, one a one-ton crane, the other a ten-ton crane. Does the operator of the larger crane work harder than the other? Is it harder to toast four slices of bread in a four-slice

MONEY SAVERS
for 8 years—
in the R. HOE PLANT
Super Service
RADIALS

The piece shown is 2¼" x 5¾" x 18½" long.

Operations in sequence include:

1—Drill and Tap four ⅝" holes, two 21/32" holes.

2—Drill and Tap four ½" holes, two 3/16" holes, ½ CT. bore.

3—Drill one 31/32" hole in one end.

4—Drill one 31/32" hole in other end.

EIGHT Super-Service Radials have been time and labor savers for eight years on a large variety of work for R. Hoe & Co., Inc., New York City.

The 5 ft. machine shown in the close up handles drilling and tapping operations on a cast iron knife support for a Flat Shaving Machine. Working to limits of +—.002", the time per piece is only 45 minutes.

You, too, can speed up production by handling drilling and tapping on Super-Service Radials. The long service life of these machines and their maintained accuracy assure savings year after year.

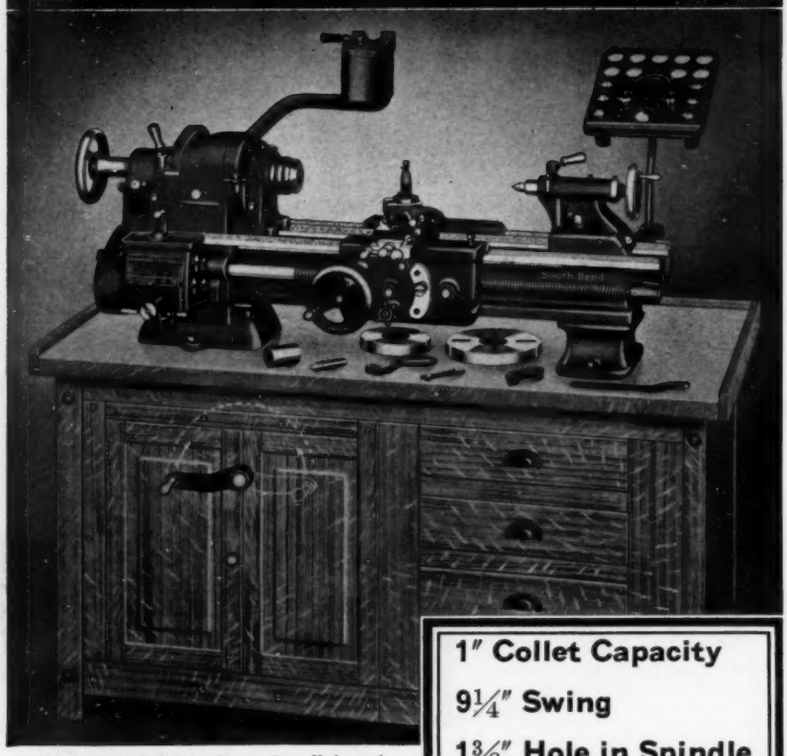
Our engineers will gladly study your requirements and recommend a profitable method of handling them.

CINCINNATI BICKFORD

toaster than one in a one-slice toaster? Everyone knows it isn't. The difference is in the machine. That illustrates industrial method. The machine makes heavy work lighter, shortens the hours of labor, reduces costs and widens the market, thus creating a multitude of new jobs for men, and sending wages to higher levels. It is not muscle but mind that achieves these human results.

Abstracted from talk No. 9 of the 1937-38 Ford Motor Co. Series broadcast over the nation-wide network of the Columbia Broadcasting System on Nov. 9, 1937, from Detroit.

New South Bend 1" Collet Lathe



9¼" Swing by 3' Bed Quick Change Gear, Underneath Belt Motor Drive Bench Lathe complete as shown above, with Draw-in Collet Chuck, 8 Collets, Collet Tray, ½ H.P. Motor, and Electrical Equipment. Wt. 680 lbs. f.o.b. factory..... $656.50

1" Collet Capacity
9¼" Swing
1⅜" Hole in Spindle
Priced $387 and up

THIS new 9-inch lathe is a back-geared Screw-Cutting lathe with all engine lathe features, and is recommended for the manufacturing plant and the tool room. Draw-in Collet attachment available in Hand Wheel Type and Quick Acting Lever type. Six tool bed turret and Double Tool slide adapt lathe to multiple operation manufacturing jobs. Telescopic Screw Type Taper Attachment and other attachments also available.

SOUTH BEND LATHE WORKS
954 East Madison Street, South Bend, Ind., U. S. A.

Write **FOR NEW CATALOG**

Catalog No. 97 illustrates, describes, and prices the new 9-inch South Bend Large Spindle Hole Lathe in Underneath Belt Motor Drive, Pedestal Adjustable Motor Drive, and Countershaft Drive Types, and in 3', 3½', 4', and 4½' bed lengths. Copy sent free, postpaid.

SOUTH BEND *Precision* LATHES

TRADE PUBLICATIONS

AIR FILTERS Bulletin No. 500-3, offered by The Northern Blower Co., 6409 Barberton Ave., Cleveland, Ohio, describes square-type air filters designed for continuous, automatic operation.

ARC WELDER Hobart Brothers, Canal Lock Square, Troy, Ohio, offer a 25-page catalog describing various models of the 40-volt arc welders which feature motor horsepower control.

BENDING MACHINES Catalog No. 32, offered by Wallace Supplies Mfg. Co., 1310-12 Diversey Parkway, Chicago, Ill., illustrates and describes a complete line of hydraulic and hand-operated bending machines suitable for bending tubing, solid bars, moldings, extruded sections, pipe and conduit in all ductile metals.

CAST IRON "Vanadium in Cast Iron" is the title of a 28-page booklet issued by the Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y. The improved physical properties of cast irons employing varying amounts of vanadium are described. Charts and tables list the specifications of various vanadium-containing irons and a number of commercial applications of vanadium irons are illustrated.

CHEMICAL EQUIPMENT Haveg Corp., Newark, Del., announces publication of technical data bulletins discussing design details, chemical resistance properties, mechanical properties and installation data for various types of chemical equipment made from molded phenolic resin asbestos composition material.

CLUTCH The 14-point engagement sleeve clutch featured on Niagara presses and shears is described in detail in a 4-page bulletin, No. C-3117, announced by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.

CONTOUR MACHINING A revised and enlarged edition of "The Contour Machining Handbook" is offered by Engineering and Research Dept., Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn. This 106-page book describes various examples of contour sawing and gives the correct machining speed for sawing or filing 48 different materials. Elimination of machining strains by correct sawing technique and the correct method of butt welding saws are discussed.

CONTROL Facilities for solving problems of automatic control, offered by General Control Co., Cambridge, Mass., are discussed in a recently published 8-page booklet.

CURRENT PUBLICATIONS Nickel Sales Dept., The International Nickel Co., Inc., 67 Wall St., New York, N. Y., has published an 8-page folder listing current literature on production and industrial applications of nickel-alloy steels, nickel cast irons, and nickel-alloyed castings.

EMANCIPATION "Machinery Does Not Enslave—It Emancipates." This is the theme of the booklet "Life, Liberty and the Pursuit of Happiness" recently published by the National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland, Ohio. This 18-page, profusely illustrated booklet compares the products of thirty or forty years ago with those of the present day. Improvements brought about by better machines, materials and methods are pointed out.

FORGINGS "Dead Weight is a Useless Burden" is the title of a six-page bulletin now being mailed by Drop Forging Association, 605 Hanna Bldg., Cleveland, Ohio. Illustrations show instances where forgings have been used to reduce dead weight and increase the efficiency of modern equipment.

FURNITURE S.A.E. chrome furniture for the office and reception room use is described in Bulletin No. 31, recently published by Wallace Supplies Mfg. Co., 1310-12 Diversey Parkway, Chicago, Ill.

GRIEVANCES Elliott Service Co., 219 E. 44th St., New York, N. Y., announces publication of a 52-page booklet on "How to Handle Grievances" by Glenn Gardiner. This booklet has been written as a guiding manual for all persons in supervisory authority, both in industry and business.

HAND TOOLS Bulletin No. U-3, a 15-page booklet offered by The International Nickel Co., Inc., 67 Wall St., New York, N.Y., has the title, "Nickel Alloy Steels for Hand Tools." Specific application data are included.

JOURNAL BEARINGS Journal-Bearing Design as Related to Maximum Loads, Speeds, and Operating Temperatures" is the title of Research Paper No. RP1037 written by Samuel A. McKee and published by National Bureau of Standards, U. S. Department of Commerce, Washington, D. C. This paper outlines briefly a method suggested as a basis for journal-bearing design for applications where the loads and speeds are variable and may reach relatively high values.

LUBRICANTS A 16-page illustrated booklet entitled "Less Oil—Less Often" describes the "Sta-Put" series of high-film-strength lubricants offered by E. F. Houghton & Co., 240 West Somerset St., Philadelphia, Pa.

MOTOR SELECTION Century Electric Co., St. Louis, Mo. offers a 24-page book which presents information concerning the electrical characteristics and descriptions of all types of fractional horse-power motors. Suggestions are given as to how they can most effectively be applied to meet the requirements of motor-driven machinery and appliances operating in normal or abnormal surroundings.

PISTON RINGS The Auto-Diesel Piston Ring Co., 1440 E. 32nd St., Cleveland, Ohio, announces publication of a new service bulletin and stock list, describing various types of rings and their applications, in sizes to 33-in. diameter. Technical data of interest to engine designers and builders, as well as operators of Diesel-powered equipment, are included.

PORTABLE TOOLS Catalog No. 65, describing and illustrating the complete line of electric drills, grinders, hammers, hole saws, sanders, safety saws, screw drivers, metal cutting shears and tool acces-

GORTON DUPLICATORS

Example 1311-H — Percolator handle die half of Nitralloy for forming Thermoplax cold molded percolator handle. Total production time for both halves of this die was formerly 110 hours. Reduced to 62 hours with 8½D Gorton Duplicator. Actual Duplicator time 20 hours for reproduction from another die.

Is the Die Shop a Bottle Neck?

Die and mold departments easily become bottle necks holding down molding, casting, or forging production for lack of working dies.

Die sinking by the ordinary methods with a block of metal, blueprints, and a milling machine takes an excessive amount of time even for simple patterns.

Gorton Duplicators are speeding up die and mold shops with no loss in accuracy. Send for Booklet 1319B, just printed, showing numerous examples of time saving with Gorton Duplicators on plastic, rubber, glass molds, etc.

GEORGE GORTON MACHINE CO.
1103 13TH ST., RACINE, WIS.

sories has been published by The Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.

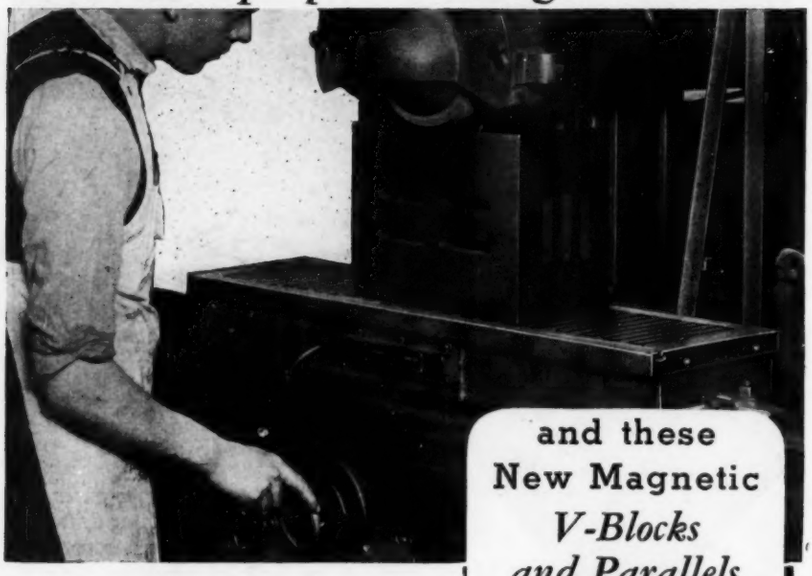
PRICE LIST National Machine Tool Co., Cincinnati, Ohio, offers Price List "S" giving prices for key seating millers and repair parts which are described in their regular catalog.

PUNCHING UNITS Hydraulic self-stripping punching units, suitable for location on a fixture to pierce holes at various angles, are described in a folder published by Progressive Welder Co., 737 Piquette Ave., Detroit, Mich.

RACK SHAPERS Automatic shapers for cutting spur and helical racks are described in a 4-page bulletin announced by The Fellows Gear Shaper Co., Springfield, Vt.

REVOLVING STOPS Revolving stops and drillholder bushings for use on turret lathes and automatic screw machines are described and listed in a folder offered by Banner Mfg. Co., 1873 Clybourn Ave., Chicago, Ill.

WIDER RANGE
of Set-Up
with a Superpower Magnetic Chuck

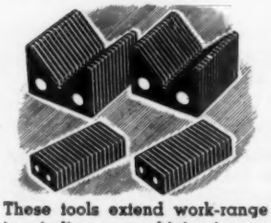


LET us show you how to increase the output, not only of grinders, but of shapers, planers, and millers, as well — with Superpower Magnetic Chucks. The services of our magnetic chuck engineers are available without charge.

THE TAFT-PEIRCE MFG. CO.
Woonsocket *Rhode Island*

Take it to TAFT-PEIRCE for Contract Manufacture, Design, Tooling, Gages, Set-Up and Inspection Tools

and these
New Magnetic
V-Blocks
and Parallels



These tools extend work-range in grinding or machining irregular-shaped parts. They carry the chuck's magnetic power well above face plate level. Applicable to any style or model of chuck. Stocked in these sizes:

T-P Magnetic Parallels	*T-P Magnetic V-Blocks*
¾ x 1½ x 3" 1 x 2 x 4"	2½ x 2½ x 1¾"

Special sizes on application.

SALES TAX "Studies in Current Tax Problems," recently published by Twentieth Century Fund, 330 West 42nd St., New York, N. Y., points out that the sales tax has a markedly high administrative cost. This fact emerges from an analysis of the cost of administering state and local taxes.

SHIMS Laminated Shim Co., Inc., 21-24 44th Ave., Long Island City, N. Y., offers an illustrated bulletin showing some of the approved applications for "Laminum" precision-adjustment shims now in use in aircraft assemblies.

SPRAY GUN Publication of a folder containing complete instructions on the operation and maintenance of the Thor Model 7 paint spray gun is announced by Binks Mfg. Co., 3114-26 Carroll Ave., Chicago, Ill.

SQUARING SHEARS Series H power squaring shears are described in Bulletin H, offered by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y. This 8-page bulletin illustrates the main features of these units and lists specifications.

TOOL HOLDERS "Four Grip" rigid tool-bit and cutting-off blade holders are listed in Circular No. 9, offered by Four Grip Tool Co., 107 E. 17th St., Paterson, N. J.

THREAD GENERATOR A 4-page bulletin describing the features of the No. 6T Type hourglass thread generator is offered by The Fellows Gear Shaper Co., Springfield, Vt.

THERMOMETERS Catalog No. 125B, offered by C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y., lists industrial thermometers, hygrometers, U-gages, mercurial vacuum gages and mercurial barometers. A supplemental price list is available for use in connection with this catalog.

TEMPERATURE INSTRUMENTS A folder now being mailed by The Lewis Engineering Co., Naugatuck, Conn., describes various pyrometers and thermocouples, as well as a rotary selector switch for connecting thermocouples to the test instrument, that are particularly adaptable to use in testing automobile engines in engine design laboratories and at the proving ground.

WELDING GUNS Hydraulic spot-welding guns and equipment offered by Progressive Welder Co., 737 Piquette Ave., Detroit, Mich., are described in an 8-page bulletin now being mailed.